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Work Plan

JORGENSEN FORGE OUTFALL SITE
STAGE 2 CMP REMOVAL

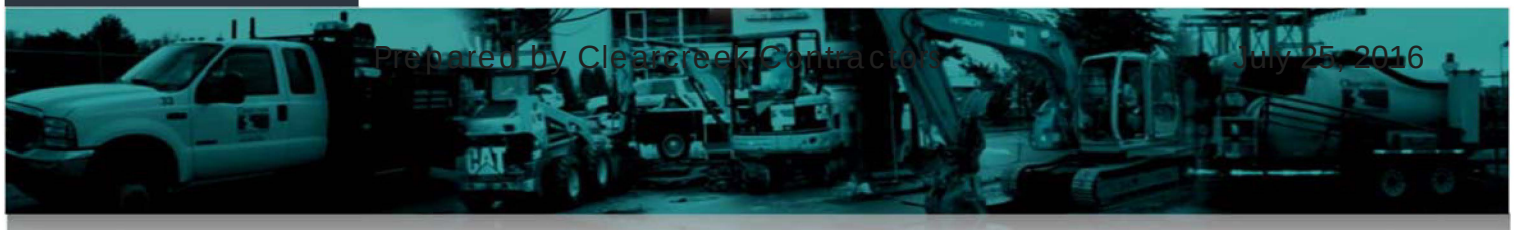
Prepared for:

Jorgensen Forge Corporation and

The Boeing Company

8531 East Marginal Way South

Tukwila, WA 98108



Clearcreek
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Environmental/Civil

September 2, 2016

Mr. Miles Dyer
Environmental Program Manager
8531 East Marginal Way South
Tukwila, Washington 98108

RE: **CONSTRUCTION WORK PLAN SUBMITTAL - JORGENSEN FORGE OUTFALL SITE - STAGE 2 CMP REMOVAL**

Dear Mr. Dyer,

Clearcreek Contractors has produced this Work Plan for the Stage 2 CMP Removal Project. The attached work plan contains the information required in Section 013310 of the project specifications.

Several items that are pertinent to sections of the Work Plan are not available at this time including 40-Hour HAZWOPER Training Certificates for some contractor and subcontractor personnel, details of signage, etc. These items will be provided to the Responsible Parties and the reviewing agencies as separate submittals during the pre-construction period.

If you have any questions or comments concerning this Work Plan please contact me.

Regards,

Daniel J. Hawk

Sr. Project Manager

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ATTACHMENTS

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1. Introduction

This work plan was developed by Clearcreek Contractors for use in implementing the Stage 2 CMP Removal project in accordance with the approved Technical Specification Section 013310 – Construction Work Plan Submittal. The document is organized into 11 sections (including this introduction) that address each of the required plans. The Site Specific Health and Safety Plan (SSHASP) and Decontamination Plan are included as attachments with a cursory overview provided within the main text section.

The following sections are included in the work plan:

- Section 1 – Introduction
- Section 2 – Site Specific Health and Safety Plan (Attachment 1)
- Section 3 – Site Controls
- Section 4 - Temporary Erosion and Sediment Control Plan
- Section 5 - Staging, Stockpiling, Parking and Truck Access Plan
- Section 6 - Decontamination Plan (Attachment 2)
- Section 7 - Dewatering Plan
- Section 8 - Steel Sheet Pile Installation Plan
- Section 9 - Dry and Wet Contaminated Soil Excavation Plan
- Section 10 - Stage 1 Excavation Area Protection Plan
- Section 11 - Plan for Environmental Protection for areas outside of the project limits

Approval of this work plan is required from EPA Region 10 prior to project implementation.

2. Site Specific Health and Safety Plan (SSHASP)

Stage 1 of the CMP Removal project was recently completed by Clearcreek on the Jorgensen Forge property using an SSHASP that addressed similar health, safety and hazards that may be encountered on the Stage 2 CMP removal project. The previous plan, however, did not include pile driving, auger drilling and expanded site control requirements for the Stage 2 work. Health, safety and hazard analyses for these tasks have been added to the previously implemented SSHASP. The amended SSHASP is provided in Attachment 1.

The Site Safety Officer (SSO) for the project will be Clearcreek's on-site designated supervisor Kurtis Jones. The SSO will be assisted by Integrity Safety, a firm that specializes in construction site safety. Integrity Safety was involved in preparation of the SSHASP and will provide safety oversight and specific on-site safety monitoring. Activities for which a Health and Safety representative from Integrity Safety will be on site include the following:

1. Pile driving intrusive activities
2. Auger shaft drilling activities
3. Inspection of site control for Subtitle C designated soil excavation
4. Periodic inspections

Training certificates for subcontract personnel and Clearcreek personnel are provided in Attachment 3.

3. Site Control Plan

General – Site controls are integral to the Staging, Stockpiling, Parking and Truck Access Work Plan, TESC and SSHASP required in Specification Section 013310. To avoid duplication in multiple plans, a separate work plan section has been included to address these features.

Site controls will be developed in stages as exposure risk to contaminated soil increases from initial site set-up and pile driving activities, to shaft drilling, to Subtitle D excavation, and finally to Subtitle C excavation. The stepwise site development is depicted in Figures 1 through 4 with details of the development provided in Figure notes. Temporary Erosion and Sediment Controls (TESC) will be installed prior to any intrusive activities and are described separately in Section 5 and shown on Figure 5.

Site control features include the following:

1. Security fencing consisting of 6' high non-barbed chain link fence panels with moveable concrete base supports
2. Support zone containing a construction trailer, employee parking and material storage area
3. Contamination reduction zone (varies depending on work activities)
4. Exclusion zone (varies depending on work activities) encompassing areas of contaminated soil handling
5. Subtitle C soil processing and storage area doubling as an equipment decontamination area
6. Truck loadout and cleaning/inspection area doubling as an equipment decontamination area
7. Excavation pads (2 areas)
8. Plastic cover to protect the previously completed EMJ remediated area south of the excavation
9. Plastic liner for swing path of excavator to catch drippings

Development of site controls are detailed in the four steps described below:

Step 1 – Site Controls for Pile Driving - Figure 1 shows the first milestone of site control at the site (STEP 1) which will be installed prior to pile driving activities. These features include:

1. Temporary Erosion and Sediment Control (TESC) measures (e.g. straw wattles and catch basin inserts – see Section 4)
2. Temporary site security fencing
3. Ingress/egress control through designated gates for equipment and personnel
4. Temporary caution tape placed to isolate pile driving activities from other site activities
5. Plastic and gravel placed on EMJ remediated area south of the Stage 2 CMP Removal area

6. HAZWOPER exclusion zone not required

Step 2 – Site Controls for Shaft Drilling - Figure 2 shows the second milestone of site control (STEP 2) and additional site controls which will be installed and in effect prior to auger drilling activities. These additional features include:

1. HAZWOPER Exclusion Zone established within perimeter of Stage 2 CMP Removal excavation area (within limits of driven sheet pile). The Exclusion Zone will be established using cones, posts, red danger tape and signage.
2. Temporary contamination reduction zone (CRZ) established adjacent to the exclusion zone using 20-mil plastic liner covered with gravel delimited by cones, posts and yellow caution tape.
3. Plastic liner (minimum 20-mil) covered with gravel and placed around drilled shafts
4. Plastic liner (minimum 20-mil) placed over Stage 2 excavation area for auger spoil management

Step 3 – Site Controls for Subtitle D Excavation - Figure 3 shows the third milestone of site control (STEP 3) and additional site controls which will be installed and in effect prior to Subtitle D excavation activities. These additional features include:

1. HAZWOPER Exclusion Zone established bounded to the south and west by security fence and to the north and east by temporary barricades and red danger tape as shown on Figure 3
2. Protective cover installed over Stage 1 CMP Removal area in the location shown on Figure 5 and as detailed on Figure 6
3. Outgoing truck inspection and decontamination area installed in the location shown on Figure 5 and as detailed on Figure 6
4. Contamination Reduction Zone (CRZ) trailer including clean PPE storage, contaminated PPE disposal container, bench, coat hooks and sign in/out sheet installed for access to the exclusion zone in the location shown on Figure 3. A 3 stage boot wash and an eye wash will be located adjacent to the transition entrance from the exclusion zone to the CRZ.
5. Construction trailer including meeting room and contractor office equipment, installed and operational

Step 4 – Site Controls for Subtitle C Excavation - Figure 4 shows the fourth milestone of site control (STEP 4) that represents full build out of the site facilities and controls. Additional site controls, which will be installed and in effect prior to Subtitle C excavation activities include:

1. HAZWOPER Exclusion Zone established bounded by security fence on all accessible sides
2. Subtitle C soil process and storage area constructed as detailed on Figure 6
3. Ecology block truck backstop installed to prevent trucks backing on to the EMJ property
4. Clean soil stockpile area constructed to store soil excavated from north of the Boeing 2-66 sheet pile wall (See Item 5 below and Figure 4). This material was previously characterized as clean and will be later reused to backfill the same area from which it

was excavated. Prior to reuse of this material, it will be sampled and tested per the "Corrugated Metal Pipe Work Plan", Sound Earth Strategies, March 8, 2016 (CMP Work Plan).

5. SSP relief excavation on the north side of the 2-66 Boeing Sheet Pile performed to avoid overstressing sheet pile
6. Drip liners placed to contain any material or moisture spillage from excavation buckets
7. Dewatering treatment facilities installed by Clearcreek and inspected and approved per King County Industrial Waste Major Discharge Authorization 4377-01

4. Temporary Erosion and Sediment Control (TESC) Plan

Temporary Erosion and Sediment Control (TESC) will consist of the following features and activities:

1. Catch basin inserts and protection for on-site catch basins
2. Straw wattles
3. Truck load out and equipment decontamination pad
4. Plastic drip liners
5. Dust Control

Figure 5 provides the location of TESC features and BMP references for materials, installation and maintenance of the features as well as dust control. Figure 6 shows construction details for the truck load out and equipment decontamination pad, Subtitle C soil process and storage area and the Stage 1 CMP Removal area protective cover. Liners for each of the features shown on Figure 6 will be a minimum of 20-mil thick and will be custom seamed at the factory prior to shipment.

5. Staging, Stockpiling, Parking and Truck Access

Staging, stockpiling, and parking areas for the project are shown on Figure 5. Materials for construction of facilities in the mobilization phase will be staged primarily on the Boeing property adjacent to the facilities being constructed. Material deliveries that cannot be delivered to the area of facility construction will be staged in the designated equipment storage and laydown area shown on Figure 5. Parking for construction employees and visitors will be in the designated parking area shown on Figure 5 located south of the construction trailer.

Truck access from East Marginal Way South will be through the main gate at the Jorgensen Forge facility. Incoming trucks will turn right after passing through the main gate, proceed north to the main access road adjacent to the north property line and then head west to the work area. Truck movement on site will be along the routes shown on Figures 7 and 8. A Clearcreek employee will be stationed at the equipment entry gate during active truck traffic to man the gate and prevent unauthorized persons from entering the controlled areas of the site. The gate will be chained and padlocked when the gate is not in use.

In general, trucks will enter the site from the east, turn into the vacant area west of the construction trailer and back-up through the equipment entry gate located at the west end of

the security fence. Trucks will back into the loading areas and position their truck beds on the designated loading areas. Once loaded, the trucks will be inspected and decontaminated as necessary prior to leaving the controlled area within the security fence. Figure 7 shows the traffic flow for Subtitle D excavation and Figure 8 shows traffic flow for Subtitle C excavation.

Clean soil excavated from the pile stress relief excavation along the north side of the Boeing 2-66 sheet pile will be stockpiled in the designated Clean Soil Stockpile area located north of this excavation as shown on Figure 4. Material from this excavation area has been pre-classified as clean and will be reused later to backfill the pile stress relief excavation. Prior to reuse of this material, it will be sampled and tested per the CMP Work Plan. The stockpile will be contained with ecology blocks, underlain with minimum 6-mil scrim reinforced plastic and covered with similar plastic when not in use.

Subtitle C soil that is too wet for direct loading will be placed and stored in the double-lined Subtitle C process area shown on Figure 4. The facility will be constructed in accordance with details provided on Figure 6. Material may be spread or turned in this facility to enhance drying as needed using either of the excavators stationed on site. The excavator(s) will be positioned outside the facility and tracks kept free of contamination. Light tracked equipment such as a skid steer loader or light dozer (CAT D3 or similar) may be used working atop the soil to push material and turn it to enhance drying.

For processing and loading operations that require digging into the process area, a 16'x24' area will be prepared by placing four 8'x12' steel sheets over the top liner to protect it from damage caused by the excavator bucket. The steel sheets will be installed above the top liner prior to placing contaminated soil in the facility and will be tack-welded together to prevent movement of the sheets over the liner. To further protect the top liner, a thin layer of sand (4" to 6" thick) will be spread beneath the steel plates prior to them being installed. The sand layer will also protect the plastic liner from damage during tack welding. Material will be moved to the steel sheet lined area for processing and/or load out whenever earthmoving equipment might otherwise come within 6-inches of the lining system.

If mechanical processing does not dry the soil sufficiently to meet the paint filter test criterion within a practical time frame, absorbents may be added to the soil to bind up excess free water. Discussion of absorbents and their addition is provided in Section 9.

6. Decontamination Plan

Decontamination requirements for equipment and personnel to be used on this project were excerpted from the JORGENSEN FORGE OUTFALL SITE, FINAL SSP DECONTAMINATION WORK PLAN, STANDARDS AND OBJECTIVES (Sound Earth Strategies, September 2, 2015) and are provided in Attachment 2.

Equipment and reusable materials will be decontaminated using "dry" methods to the extent possible and follow procedures in conformance to those described in the approved JFOS Decontamination Plan referenced above. The decontamination facilities will be set up within the

exclusion zone at the three locations shown on Figure 4. Decontamination facilities include the following:

1. Truck load out and equipment decontamination pad
2. Subtitle C soil process area that will be converted to a decontamination pad
3. Personnel Contamination Reduction Zones (CRZ). See SSHASP in Attachment 1 for CRZ set-up requirement.

Detail sections of the two equipment decontamination facilities are shown on Figure 6.

Initial cleaning of excavation equipment may be performed over the Stage 2 CMP Removal area during active excavation periods (prior to final cleaning) to remove bulk contamination from the excavator buckets prior to transport to one of the equipment decontamination facilities for final decontamination. Bucket cleaning over the Stage 2 excavation area would be performed by pressure washing or by scraping with shovels, spud bars or brooms with the bucket held below the level of the sheet pile. Safety provisions for egress from the excavation area will be provided per the SSHASP in Attachment 1.

During performance of the work, equipment coming into contact with potentially contaminated soil will be decontaminated over the truck load out and decontamination facility, or over the Subtitle C Soil Process and Storage area, when appropriate. At the end of Subtitle C soil removal operations, the Subtitle C Soil Process and Storage area is no longer needed and will be converted to a decontamination work zone by removing the uppermost 20-mil plastic liner and replacing it with a clean 20-mil plastic liner.

Provisions will be made at each of the constructed decontamination facilities to collect and transfer contaminated liquids to the temporary on-site dewatering treatment system (DTS) as described in the following sentences. Collection sumps will be installed in the two equipment decontamination facilities and potentially contaminated water will be pumped using sump pumps and hoses to the weir and storage tanks in the DTS facility. Water used to initially clean equipment over the Stage 2 CMP Removal area (such as excavator buckets) will be allowed to drip into the contained area and will be handled with other potentially contaminated water pumped from the Stage 2 excavation limits. Contaminated water collected in boot washes and personnel decontamination facilities will be transferred to buckets equipped with watertight lids, or similar containers and transferred to the settling tanks of the DTS facility.

Limited amounts of liquid wastes from final decontamination activities (i.e. decontaminating DTS tanks and plumbing during decommissioning) will be placed in a storage container(s) (barrels, small roll-off box or tote) and disposed through an outside vendor such as Emerald Services. PCB contaminated soil wastes accumulated during final decontamination will be placed in a roll-off box and transported to disposal at US Ecology, a Subtitle C facility. Miscellaneous decontamination waste and site rubbish that qualifies for disposal in a Subtitle D facility will be transferred to Republic Services 3rd and Lander facility for transfer to the Roosevelt Regional Landfill.

7. Dewatering Plan

Dewatering Treatment System - A dewatering water treatment system (DTS) will be installed at the site in the location shown on Figure 4. The treatment system will be constructed in accordance with the requirements of the King County Industrial Waste Major Discharge Authorization 4377-01, and used to treat potentially contaminated water pumped from the excavation, water generated on site from material drainage in the Subtitle C process area, wash water collected in the truck load out/decon pad, contaminated water collected from personnel decontamination and other potentially contaminated waters generated at the site.

The dewatering system will consist of the following equipment:

1. One settling/storage tank (approx. 20,000 gallons)
2. One weir tank (approx. 18,000 gallons)
3. Bag filter(s) with 200 gpm capacity (25 micron bags in first canister and 10 micron bags in second canister per setup)
4. Four 2,000 lb granulated activated carbon (GAC) vessels
5. 3" totalizing flow meter
6. Transfer pumps
7. Associated piping, valves and fittings

The tanks and treatment unit are designed for a treatment capacity of 200 gpm per project specifications (see Specification Section 312319). Treated water will be discharged to the KCIW permitted sewer inlet located near the central portion of the Jorgensen site as indicated on Figure 4. A process schematic of the waste water treatment system is shown on Figure 13.

Stage 2 Enclosure Dewatering System – Groundwater will be pumped from the Stage 2 Enclosure to the treatment system via pumps installed in a sump or sumps constructed in the excavation. The sump(s) will be installed from about Elevation 6 to just below Elevation -4. The sump(s) will be constructed by potholing to Elevation -4 using a long-reach excavator, placing a large diameter slotted ADS corrugated pipe in the sump pit (12" to 18" diameter) and backfilling around the pipe with gravel. Gravel for sumps will meet the gradation of Permeable Gravel Ballast as defined in WSDOT Standard Specification Division 9-03.9(2). Only gradation requirements of the Permeable Gravel Ballast will apply.

Sealing the SSPs - Part of dewatering efforts include placing caulk along the seams of sheet piling exposed in the excavation from the surface down to elevation -4 and covering the interior exposed piling surface with plastic as described below.

The caulk used will be A-788 Splash Zone Compound. Splash Zone is a two-part epoxy patching compound used to seal leaks in metal in marine environments. SDS information for the compound is provided in the attached SSHASP. The plastic used will be 15-mil Yellow Guard plastic that meets the requirements of Section 126123 – 2.2C as amended by Addendum 1 of the Bid Documents.

The caulk will be applied to visible steady streams of water seeping through SSP wall joints using labor, ladders, scaffolding, and lifting equipment for access. The plastic will be placed around the

interior perimeter of the exposed piling from above elevation 11 down to about elevation -4.

Flooded Stage Water Addition and Removal – Water will be added from the nearby Fire Hydrant on Plant 2 to flood the excavation to the design elevation to allow the excavation to proceed to the design depth. Water removed from the flooded Stage 2 CMP removal area during backfill operations (See Section 9) will be transferred through 4" HDPE piping and/or 4" flexible hoses to the DTS for treatment prior to discharge. Backfill placement rates during backfilling operations will be restricted to approximately 60 cy/hr (200 gpm) so as not to exceed the treatment capacity of the DTS system.

Dewatering System Commissioning – At the beginning of dewatering operations for the Subtitle C excavation between Elevation 6 and -4, water will be transferred to and stored in the weir tank shown on Figure 4. An initial batch of water (at least 1,000 gallons and up to 10,000 gallons) will be pumped through the DTS filter system and GAC treatment vessels and transferred to the yet uncontaminated water storage tank using temporary hoses. A sample of the treated water will be collected by the Responsible Parties and tested for parameters listed in the KCIW discharge permit attached in Attachment 4. A 24-hour turn-around testing period will be used. Upon receipt of results showing the treated water meets the permitted discharge limits and written approval is received from King County, the treatment system will be considered commissioned and water treatment and discharge operations will commence.

Operation of Dewatering Treatment System

A layout of the DTS is shown on Figure 5 and a flow diagram of the treatment system is provided on Figure 13. In addition to the treatment facilities shown, flocculant will be added during the dewatering treatment to enhance settling/removal of fines. Flocculent will be added passively to water entering the weir and storage tanks through in-line chitosan gel sock contactors.

The following construction activities will require water treatment:

1. Dewatering for Subtitle C excavation between Elevation 6 and Elevation -4.
2. Pumping water from the flooded excavation area as backfilling progresses.
3. Treating excess water that leaks into the excavation area
4. Treating contaminated water generated during decontamination activities
5. Treating rainfall that falls directly in the Subtitle C excavation area, soil process area and/or equipment decontamination areas.

During dewatering of the excavation, the DTS will be operated continuously 24-hours per day and monitored full-time to see that:

1. tanks are not overfilled
2. pumps are operating and generators are fueled
3. piping systems are not leaking
4. bag filters are not clogging
5. chitosan gel socks are replaced when depleted
6. treatment effluent is clear and flowing freely into the downstream tank
7. the flow meter is functioning
8. system pressure and discharge flow rates are within permit limits

Bag filter and GAC units clogging will be checked using pressure indicators positioned on either side of the units as shown on Figure 13. The Daily DTS Operations Checklist form provided in Attachment 6 provides criteria for changing out bag filters and carbon. Sampling and testing of discharge water required in the KCIW discharge authorization will be performed by Jorgensen Forge/Boeing as described in the Section on DTS Sample Collection and Testing below.

A second dewatering event is required to remove water from the flooded excavation area as the excavation is backfilled. Clearcreek will remove water from the excavation at the rated capacity of the water treatment system (approximately 200 gpm) and balance backfill placement rates to maintain the water surface within the excavation at Elevation 10. This is required to provide structural support to the Boeing 2-66 sheet piling. During backfill operations, the DTS will be manned continuously and checked for the operation and monitoring items listed above.

Water anticipated from decontamination activities, sheet pile barrier leakage (after grouting seams) and rain falling directly on areas containing contaminated soils are expected to be under 40,000 gallons for the project. This contaminated water will be treated on an as needed basis and the system operated and monitored as necessary.

DTS Sample Collection and Testing

Discharge – Treated water will be discharged directly from the DTS to the authorized sewer inlet located in the central portion of the Jorgensen Forge facility as shown on Figure 4. After the system has been commissioned, sampling of the treatment system discharge will be performed by the Responsible Parties consistent with the requirements of King County's Major Discharge Authorization No. 4377-01. The sampling parameters and frequency are as follows:

Parameter	**Frequency**
Daily Discharge Rate	Daily
Flow Rate	Daily
Settleable Solids, Volumetric	Daily
PCBs	First day of discharge and weekly thereafter

8. Steel Sheet Pile (SSP) and Drilled Shaft Installation Plan

Clearcreek has subcontracted steel sheet pile installation to Ford Crane. Personnel from Ford Crane will install sheet pile within the Stage 2 CMP removal area as shown on Figure 1 and on Drawing C-4 of the Project Drawings. Ford Crane will also remove sheet piling after the excavation is backfilled and assist with sheet pile decontamination. Personnel provided by Ford Crane are experienced with sheet pile driving and are 40-hour HAZWOPER trained.

Clearcreek has subcontracted drilled shaft installation to Pearson Drilling. Personnel from Pearson Drilling will install the drilled shafts within the Stage 2 CMP removal area as shown on Figure 2. Personnel provided by Pearson Drilling are experienced with auger drilling and those working in proximity to contaminated soils will be 40-hour HAZWOPER trained.

The equipment and procedures for SSP installation and auger drilling are provided in the following sections.

SSP Equipment

For assembling the pile driving equipment and for installing the SSPs, Clearcreek and Ford Crane will use the following large equipment:

1. Hitachi ZAXIS 200LC (or equivalent) – crane assembly assistance
2. American 7530 crawler crane with 120' of boom – pile driving and crane assistance
3. APE 150 Vibratory Hammer – installing and removing sheet piles
4. TMS 300B 40 ton hydraulic crane – assembling pile driving crane, moving sheet piles and initial sheet pile placement, handling sheet piles during decontamination
5. Genie S-80X Man Lift – assist with assembling equipment and rigging

Specifications for specialty and large equipment are provided in Attachment 5.

SSP Installation

Handling - Sheet piles will be loaded on a 48-foot flat-bed truck using the 40-ton crane and transported to a laydown area on the Boeing property north of the installation area (See Figure 3-1). The 40-ton assist crane will be used to position and thread piles into previously driven piles for driving by the vibratory hammer attached to the 125-ton pile driving crane. The assist crane will also be used to help assemble the pile driving crane and to manage the sheet piles along with the Hitachi ZAXIS 200LC excavator in the decontamination area.

Template – On two of the walls, a sheet pile template consisting of a W36 x 175 I-beam will be laid so that it is supported evenly on the ground. Some initial grading may be required along the template alignment to allow the I-beam to be supported evenly. The template has an adjustable guide to which the leading edge of the driven sheet can be held to keep the sheet pile in line with the template. For the short section of wall in the northwest corner, the sheets will be free driven.

Installation – Installation of the sheet piles is planned to start at the short wall on the NW corner of the excavation area. The first sheet pile comprised of two sheet pile sections (sheet pile pair) will be placed and driven down approximately half way. Then the 40-ton crane will be used to lift a second sheet pile pair and the man-lift will be used to guide the sheet pile so that it can be threaded into the first pair of sheets. A third sheet pile pair will be threaded in the same manner and the piles driven to depth. Following installation of the CDF shafts, this corner will be completed by threading and driving a single sheet into the fresh CDF placed in the drilled shafts to make the sealed corner connection. The south and east walls will be installed using similar procedures. Drilled shafts will be installed as described in the Overlapping Drilled Shaft section below.

Rigging Certification and Lift Calculations – Rigging for pile driving will be inspected and certified to meet OSHA criteria for the loads handled. Crane lift calculations will be performed by Ford Crane to verify that load capacity is not exceeded. The rigging certifications and lift calculations will be provided under separate submittal.

Pulling Piles – Ford Crane plans to attach the individual 60-foot steel sheet pile pairs to the vibratory hammer using shackles and completely removing each individual pair out of the ground in a single operation. The piles will be removed by operating the vibratory hammer and lifting the piles with the 125-ton crane at the same time. The sheet pile pairs will be laid on dunnage and stacked in a prepared containment area (relined Subtitle C process and storage area) prior to decontamination. See Attachment 2 for decontamination procedures and details.

Overlapping Drilled Shaft Installation

Drilling operations will be performed by positioning the EX 200 track mounted drill rig on the Boeing property at the locations shown on Figure 2. Multiple telescoping Kelly bars will be used to reach the required depth of 40 feet. The rig will be positioned so that it may rotate and deposit cuttings on plastic lined containment within the Stage 2 excavation area that will be managed by Clearcreek. A total of about 60 cy of cuttings will be generated during the drilling operation. Drill cutting material will be placed inside the excavation area to be later loaded on trucks and hauled directly to disposal at Republic Services 3rd and Lander transfer facility.

Multiple casings will be used in a telescoping fashion to install four 40-foot deep shafts in the locations shown on Figure 2. There are two overlapping shafts in each pairing, as shown on the figure. The shafts to the outside of the excavation limits at each location will be drilled first, filled with 1 ½ sack lean concrete mix and allowed to achieve an initial set. The second shaft installation at each corner connection will be closely coordinated with sheet pile installation so that the final sheet pile installed at each connection corner point may be driven through fresh CDF material.

The lean concrete will be delivered to the site in pumper trucks and placed in the shaft from bottom to top using tremie methods. As concrete is placed and ground water is forced upward, the excess water will be pumped to the DTS using a 3" submersible pump. Water will be transferred through a 4" diameter pipeline installed by Clearcreek prior to the drilled shaft operation.

9. Dry and Wet Contaminated Soil Excavation Plan

There are four phases of excavation within the Stage 2 CMP removal area shown on Figure 5 and depicted on an East-West Cross-Section through the Stage 2 area shown at various stages of development in Figures 9 through 12. These phases consist of the following:

1. Phase 1 – dry excavation from existing ground surface to the top of existing 12-inch and 24-inch corrugated metal pipes (CMPs) at approximate elevation 6 (See Figure 9)
2. Phase 2 – removal of CMPs and dewatered excavation to elevation -4 (See Figure 10)
3. Phase 3 – wet excavation to elevation -9 (See Figure 11)
4. Phase 4 – wet excavation to final grades (See Figure 12)

A description of the methods and equipment, and each phase of excavation and backfill is

provided in the sections below.

Excavation of the Subtitle D and Subtitle C soil material will be performed with a variety of excavators. A Hitachi 200 excavator will be used for excavating the first phase down to the corrugated metal piping and a long-reach excavator (CAT 350 and/or Komatsu PC400LC-LR) will be used for subsequent phase excavations.

Paint Filter Testing - Some material excavated from the Stage 2 CMP removal area will be wet and in a condition where direct loading to trucks might not meet regulatory and WSDOT requirements for transport. A lined Subtitle C soil process and storage area is included for handling these materials. The wet soils will be drained and/or processed until the material meets criterion of the Paint Filter Liquids Test (EPA Method 9095B).

A visual inspection of the soils will be performed to confirm the consistency is conducive to hauling and disposal. If the material fails the paint filter test, additional draining or processing will be performed until the paint filter criterion is met. Paint filter tests will be performed unless visual observations indicate the material is sufficiently dry for direct loading and disposal.

Excavation and Backfill Approach

After sheet piles are installed and site controls are in place, Clearcreek will use the following procedures, sequencing and methods in performing the staged excavation and backfill:

1. Phase 1 (Figure 9) - dry excavation from surface to top of stormwater pipes – involves normal excavation using a 50,000 lb class excavator (Hitachi 200 or equivalent) and direct loadout to truck and trailers for disposal at a Subtitle D facility (Republic Services 3rd and Lander transfer facility). Truck and trailers will back into a loadout area located directly east of the excavation (See Figure 7). The excavator will begin on the west side of the sheet pile area and excavate to the top of stormwater pipes progressively moving the excavation from west to east. Trucks will be loaded above the Stage 1 CMP Removal area protective cover and will be inspected and cleaned, if necessary, prior to them leaving the loading area. The vertical extent of the Phase 1 excavation is shown on Figure 9.

2. Phase 2 (Figure 10) – removal of existing CMPs and dry excavation from the top of pipes to elevation -4 using a long-reach excavator. Before Stage 2 excavation begins, a sump or sumps will be installed to dewater the material and the Boeing 2-66 sheet pile relief excavation will be completed (See Figure 4). Dewatering water will be pumped to the dewatering treatment system located in a central position of the Jorgensen Forge yard (See Figure 4). Material excavated in this stage will be directly loaded into truck and trailers for transport to Subtitle C disposal (US Ecology Subtitle C facility in Grand View, Idaho) or placed in the Subtitle C soil process area if additional moisture reduction is necessary. The truck loading facility and traffic patterns for Subtitle C excavation are shown on Figure 8. The vertical extent of the Phase 2 excavation is shown on Figure 10.

The Komatsu PC400LC-LR or CAT 350 long reach excavator will begin the Stage 2 excavation located in the Excavation Pad 1 area on the Boeing facility (See Figure 4) in order to reach the western portions of the excavation. After elevation -4 is reached in the western reaches of the excavation area, the excavator will reposition to Excavation Pad 2 located just east of the sheet pile cell. Note that Excavation Pad No. 1 is positioned 20-feet outside the Boeing 2-66 sheet pile wall as required in the specifications.

3. Phase 3 (Figure 11) – Excavation from elevation -4 to elevation -9. After caulking and taping joints and installing plastic sheeting around the inside perimeter of the sheet pile enclosure, the excavation area will be flooded to elevation 10 (See Figure 11). The long reach excavator positioned on Excavation Pad 2 will begin to remove material in the wet down to elevation -9. The excavated material will be drained while in the bucket over the excavation area for up to 1 minute, then placed in the Subtitle C soil process area for storage and processing. Plastic sheeting will be laid along the swing path of the excavator to collect any bucket drippings. Once the material has dried sufficiently to meet the paint filter test, the material will be loaded into trucks for transport to US Ecology's Subtitle C facility in Grand View, Idaho.

4. Gravity drainage and drying of the material stockpiled in the process area will continue as needed and as technically practicable to meet the paint filter test criteria. A minimum of 5 samples per day of load out for the paint filter test will be collected from throughout a pile that has been sufficiently dried for off-site transport and disposal. This sampling will be done in coordination with EPA's on-site representatives. Should wet excavated material not dry to a condition where it passes the paint filter test criterion after 24 hours and stockpile containment space is needed to meet project objectives and schedules, absorbent may be added to stockpiled materials to enhance the drying process as follows:

   An absorbent such as cement, diatomaceous earth, or sawdust will be delivered to the site and stockpiled in a controlled area near the Subtitle C soil process area. Dust control measures will be used for addition of any of these absorbents. The absorbent will be added to the wet soil material using the Hitachi 200 or long-reach excavator over a steel plated area pre-set in the processing cell. The absorbent material will be thoroughly mixed with the wet soil until successful results are achieved using the paint filter test.

   Initial absorbent batching will be approximately as follows for each of the absorbent options:

   1. Cement – 2% by estimated dry weight
   2. Diatomaceous earth – 5% by volume
   3. Sawdust – 5% by volume

   Absorbent batch concentrations will be adjusted up or down based on the moisture content of the soil and effectiveness of the absorbent in reducing free water in the processed soil stockpile.

5. After the excavation has reached elevation -9, flocculent will be added to the water in the flooded excavation and left for a 24-hour period as required in Specification Section 026024 Paragraph 3.7. The flocculant (HaloKlear LiquiFloc) will be added as water from

the excavation is circulated within the excavation area using a centrifugal pump. After the appropriate amount of flocculant is applied using the manufacturers recommendations, the water will be kept undisturbed to the extent practical until the settling process is completed based on visual observations or up to a maximum 24-hour period as required in Specification Section 026024 Paragraph 3.7. Water will only be pumped into or out of the excavation during this period to maintain levels within the excavation limits at elevation 10 to provide continued support to the perimeter sheet pile.

6. Phase 4 – Wet excavation to final grades. After the flocculation and settlement event is completed, the long-reach excavator will continue excavating to the design grades (See Figure 12) at maximum depth shown on the project drawings (elevation -16) using the procedures described in Item 3 above.

7. After the excavation has reached design grade contours (maximum depth to elevation -16), flocculent will be added to the water in the flooded excavation a second time and left undisturbed until the settling process is completed based on visual observations or up to a maximum 24-hour period as required in Specification Section 026024 Paragraph 3.7. The flocculation activity will be the same as described in Item 5. A pass will be made with the long-reach excavator across the bottom of the excavation to remove flocculated material at the end of the flocculation period.

8. Confirmation samples will be obtained by Jorgensen Forge/Boeing at this point and submitted for analyses using the clamshell excavator bucket to grab an undisturbed sample or other means as determined in coordination with EPA. Samples will be tested with a 24-hour turnaround and results will be made available upon receipt from the laboratory which is expected to be by the close of the following work day.

9. After favorable testing results are received and EPA approval is granted, (i.e., PCBs less than or equal to 1 PPM), Clearcreek will begin backfilling operations by placing gravel borrow at the base of the excavation using the long-reach excavator. Backfill will be compacted by “pushing” down on the placed material with the excavator or clam bucket. Backfill rates will be limited to about 60 cy/hr, which is equivalent to the capacity of the dewatering treatment system (200 gpm), since water in the excavation area must be removed and treated as the backfill progresses.

10. The backfill operation will continue in this manner until the excavation has reached elevation 5. Displaced water will be pumped from the excavation to the dewatering treatment system to maintain the water surface at approximately elevation 10 as the “wet” backfill operation progresses. At this point, the stress relief excavation north of the Boeing 2-66 sheet pile (see Figure 4) will be placed and compacted to refill the excavation.

11. Once the backfill operation has reached Elev. 10, gravel borrow will be placed and compacted using conventional methods as described in the project specifications. Samples of in-place backfill will be taken by Jorgensen Forge/Boeing and tested for compliance with environmental limits of clean soil in accordance with sampling and characterization methods described in the CMP Work Plan. Backfill will be placed to interim grades specified on the project drawings and a direct push probe investigation will be performed by the Responsible Parties along the west edge of the Stage 2 Excavation area.

12. After the direct push probe investigation is completed, Clearcreek will finish backfill operations by placing and compacting quarry spalls to final grades.

10. Stage 1 Excavation Area Protection Plan

A protective cover will be placed over the Stage 1 CMP Removal area to protect the clean Stage 1 area from recontamination during performance of the work. The protective cover will consist of a 20-mil reinforced plastic liner covered with a drain net heat bonded to an 8 oz geotextile and overlain by a 6-inch minimum thick layer of quarry spalls.

The protective cover will be installed prior to the start of excavation in the Stage 2 CMP Removal area. Truck beds will be parked over this area during Subtitle D soil excavation and load out. A detail section of the protective cover is shown on Figure 6.

11. Environmental Protection for Areas Outside Project Limits

Environmental protection will be provided for areas outside project limits by:

1. Containing on-site waste materials with berms and lining systems to prevent contamination from contacting pavement thus preventing it from being carried off the site
2. Placing plastic below excavator swing paths to collect and contain contamination that could drip from loader buckets
3. Installing and maintaining filter fabric inserts in catch basins located within the site boundaries
4. Installing minimum 8” high straw wattles around catch basins located within the site boundaries
5. Blocking catch basins that are covered by site control facilities
6. Installing minimum 8” high straw wattles backed by security or plastic snow fence along downgradient portions of the site (bordering the Duwamish Waterway)
7. Placing and fastening down minimum 6-mil scrim reinforced plastic cover over the area south of the excavation and near the Duwamish shoreline

Figure 5 shows the Temporary Erosion and Sediment Control provisions including protections for areas outside the project limits.

FIGURES

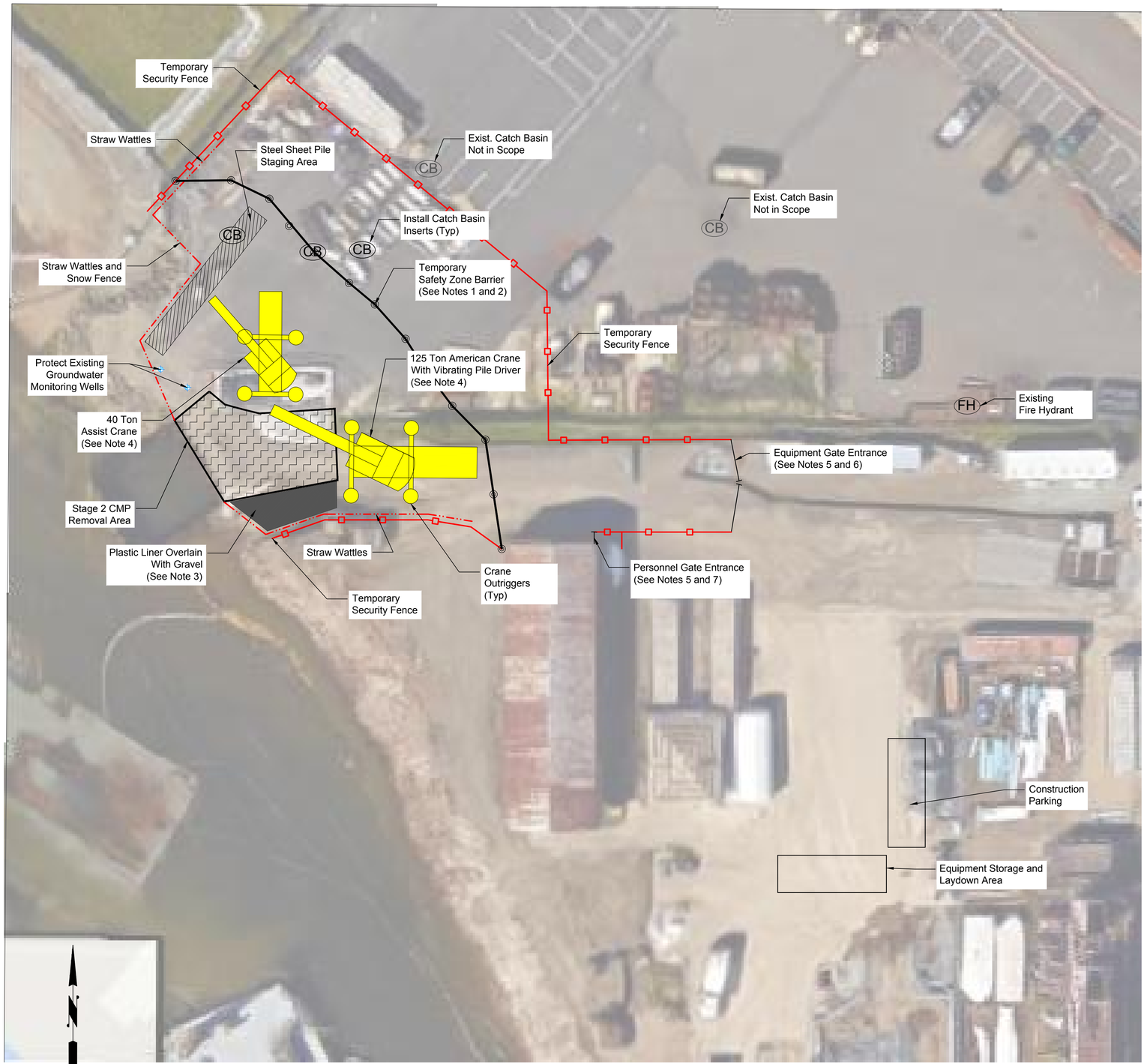

FIGURE 1

1

0 10' 20' 40'

NOTES:

1. A HAZWOPER EXCLUSION ZONE WILL NOT BE ESTABLISHED DURING STEP 1 - PILE INSTALLATION ACTIVITIES.
2. INSTALL TEMPORARY SAFETY ZONE BARRIER AS SHOWN TO LIMIT ACCESS IN VICINITY OF PILE DRIVING ACTIVITIES. BARRIER WILL CONSIST OF CANDLESTICK POSTS WITH CAUTION TAPE ATTACHED.
3. INSTALL PLASTIC LINER OVER EMJ SURFACE SOILS FOR PROTECTION IN AREA SHOWN FOR PERSONNEL ACCESS. PLASTIC LINER WILL BE OVERLAIN BY 6" OF GRAVEL AND REMOVED AT COMPLETION OF PROJECT.
4. CRANE LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE ADJUSTED DURING PILE INSTALLATION TO FACILITATE CONSTRUCTION.
5. ENTRYWAYS WILL BE KEPT SECURED WITH PADLOCK AND CHAIN DURING NON-WORKING PERIODS.
6. EQUIPMENT ENTRY GATES WILL REMAIN CLOSED DURING WORKING HOURS EXCEPT FOR EQUIPMENT ENTRY. DURING ACTIVE USE GATE WILL BE ATTENDED BY A CLEARCREEK EMPLOYEE.
7. PERSONS WILL ENTER THE SECURED AREA THROUGH THE INDICATED PERSONNEL GATE ENTRANCE AND WILL WEAR AT A MINIMUM PPE PER REQUIREMENTS OF CLEARCREEK CONTRACTORS SSHASP. VISITORS MAY ENTER THE SITE IF ESCORTED BY AN AUTHORIZED REPRESENTATIVE OF JORGENSEN FORGE, BOEING OR CLEARCREEK.

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STEP 1
Site Controls
For Sheet Pile Driving

FIG. 1

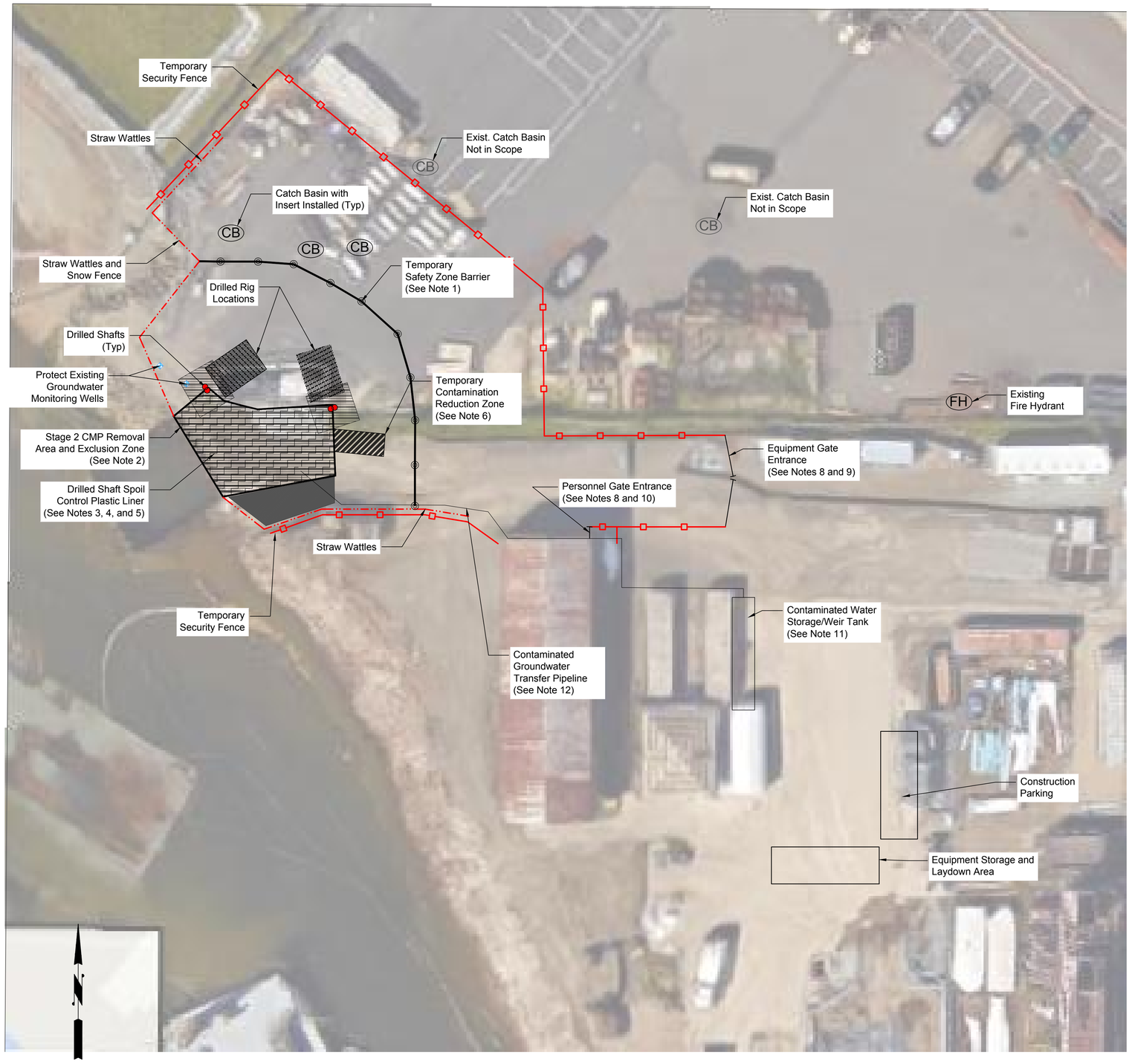

FIGURE 2

2

0 10' 20' 40'

Notes:

1) TEMPORARY SAFETY ZONE WILL BE ESTABLISHED AROUND IMMEDIATE WORK AREA USING CANDLESTICKS AND YELLOW "CAUTION" TAPE.
2) AN EXCLUSION ZONE WILL BE ESTABLISHED BOUNDED BY THE STAGE 2 CMP REMOVAL AREA SHEET PILE LIMTS.
3) THE DRILL RIG WILL CLEAN AUGERS ON A 6-MIL SCRIM REINFORCED PLASTIC LINED AREA. PLASTIC LINER WILL BE LAID ON THE GROUND SURFACE INSIDE THE LIMITS OF THE STAGE 2 CMP REMOVAL AREA AND AROUND DRILL SHAFT LOCATIONS AS SHOWN (ALSO SEE NOTE 7).
4) SPOILS WILL BE MANAGED BY CLEARCREEK WITHIN THE LIMITS OF THE STAGE 2 CMP REMOVAL AREA UNTIL THE MATERIAL IS LOADED OUT FOR DISPOSAL TO A SUBTITLE D FACILITY.
5) SPOIL PILES WILL BE COVERED WITH MINIMUM 6-MIL PLASTIC LINER WHEN PILES ARE INACTIVE.
6) A TEMPORARY CONTAMINATION REDUCTION ZONE (CRZ) WILL BE INSTALLED LEADING UP TO THE EXCLUSION ZONE BOUNDED BY THE STAGE 2 CMP REMOVAL AREA. THE CRZ WILL BE ROPED OFF AND LINED WITH PLASTIC LINER. WITHIN THE CRZ WILL BE A BOOT WASH, HAND WASH, PPE SUPPLIES AND PPE DISPOSAL CONTAINER.
7) DRILLED SHAFTS: PLASTIC WITH GRAVEL COVER WILL BE PLACED AROUND EACH SHAFT LOCATION A MINIMUM OF 6 FT BEYOND THE LIMITS OF THE SHAFT. DRILL CUTTINGS THAT MAY ACCUMULATE AROUND THE SHAFT WILL BE SHOVELED BACK INTO THE DRILLED HOLE FOR SUBSEQUENT REMOVAL BY THE AUGER.
8) ENTRYWAYS WILL BE KEPT SECURED WITH PADLOCK AND CHAIN DURING NON-WORKING PERIODS.
9) EQUIPMENT ENTRY GATES WILL REMAIN CLOSED DURING WORKING HOURS EXCEPT FOR EQUIPMENT ENTRY. DURING ACTIVE USE GATE WILL BE ATTENDED BY A CLEARCREEK EMPLOYEE.
10) PERSONS ENTERING THE SECURED AREA WILL BE THROUGH THE INDICATED PERSONNEL GATE ENTRANCE AND WILL WEAR AT A MINIMUM PPE PER REQUIREMENTS OF CLEARCREEK CONTRACTORS SSHASP. WORKERS ENTERING THE EXCLUSION ZONE AND IN POTENTIAL CONTACT WITH CONTAMINATED SOILS OR AIR MUST HAVE MINIMUM 40-HOUR HAZWOPER TRAINING AND CURRENT 8-HOUR REFRESHER COURSE. WORKERS WILL BE ALLOWED IN THE EXCLUSION ZONE WITH MINIMUM 24-HOUR OSHA TRAINING PROVIDED AIR MONITORING INDICATES SAFE BREATHING ZONE CONDITIONS AND WORKER PERFORMS NO DIRECT HANDLING OF CONTAMINATED MATERIALS. VISITORS MAY ENTER THE SITE IF ESCORTED BY AN AUTHORIZED REPRESENTATIVE OF JORGENSEN FORGE, BOEING OR CLEARCREEK.
11) ONE 20,000 GALLON STORAGE/WEIR TANK WILL BE MOBILIZED TO THE SITE TO STORE CONTAMINATED GROUNDWATER GENERATED DURING DRILLED SHAFT INSTALLATION. THIS TANK WILL BE INCORPORATED IN THE DEWATERING TREATMENT SYSTEM.
12) PROVIDE 4" HDPE PIPELINE TO TRANSFER POTENTIALLY CONTAMINATED GROUNDWATER FROM THE DRILLED SHAFT OPERATION TO THE CONTAMINATED WATER STORAGE TANK. THIS PIPELINE WILL BE INCORPORATED IN THE DEWATERING TREATMENT SYSTEM.

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STEP 2
Site Controls For
Shaft Drilling

FIG. 2

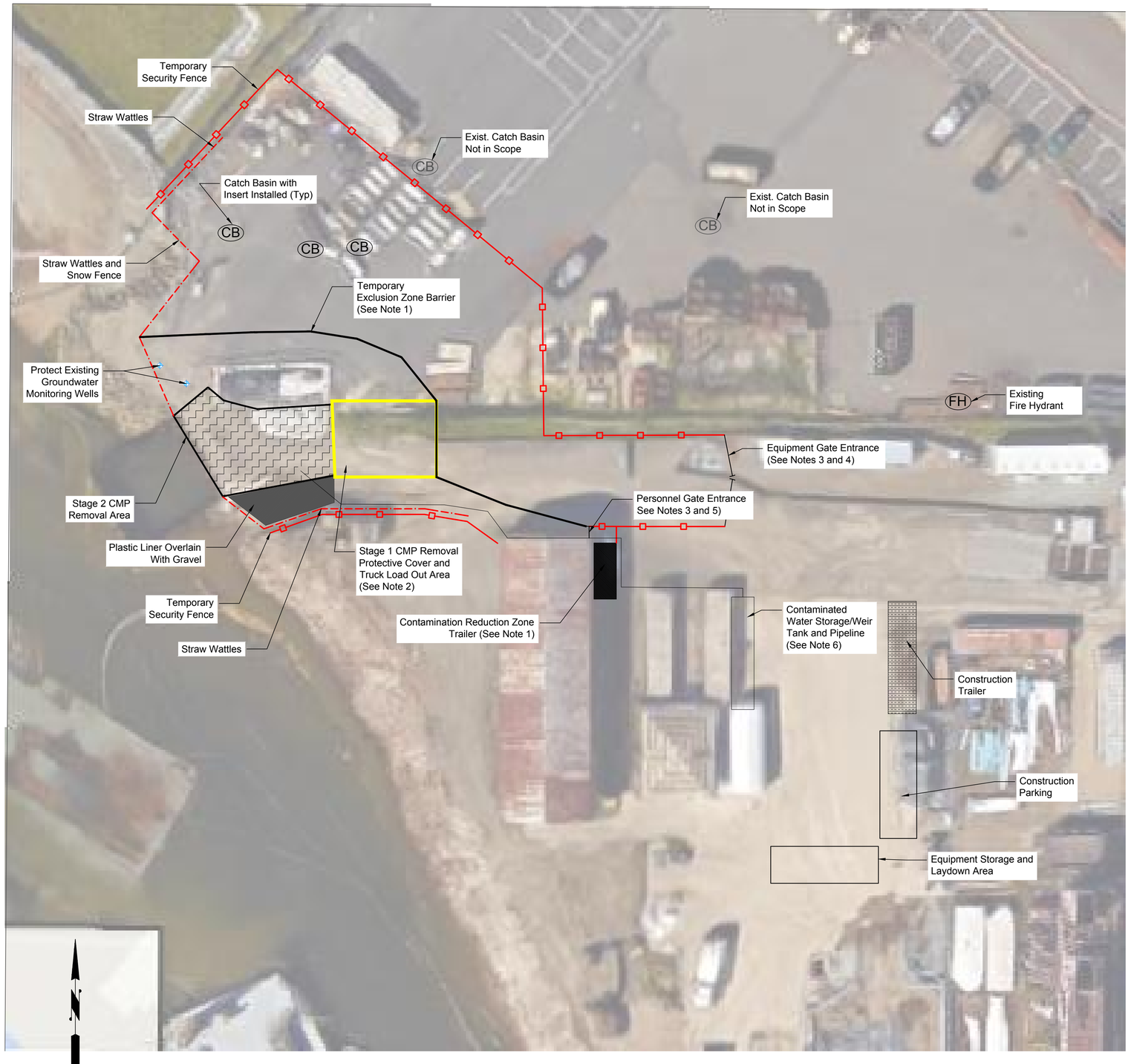

FIGURE 3

3

0 10' 20' 40'

NOTES:

1. AN EXCLUSION ZONE WILL BE ESTABLISHED DURING STEP 3 - SITE CONTROLS FOR SUBTITLE D SOIL EXCAVATION. ALL PERSONNEL ENTERING EXCLUSION ZONE BOUNDED BY TEMPORARY EXCLUSION ZONE BARRIER (RED TAPE TIED TO POSTS) TO THE NORTH AND TEMPORARY FENCE TO THE SOUTH SHALL DO SO THROUGH THE CRZ FACILITY. SEE ALSO NOTE 5 FOR TRAINING AND PPE REQUIREMENTS FOR EXCLUSION ZONE ENTRY.
2. A PROTECTIVE COVER WILL BE INSTALLED OVER THE STAGE 1 CMP REMOVAL AREA AND THIS AREA USED FOR TRUCK LOADING DURING SUBTITLE D MATERIAL EXCAVATION. TRUCKS WILL BE INSPECTED AND DECONTAMINATED AT THE POINT OF LOADING. STAGE 1 PROTECTIVE COVER WILL BE CONSTRUCTED AS SHOWN ON FIGURE 6.
3. ENTRYWAYS WILL BE KEPT SECURED WITH PADLOCK AND CHAIN DURING NON-WORKING PERIODS.
4. EQUIPMENT ENTRY GATES WILL REMAIN LOCKED UNLESS REQUIRED TO BE OPENED FOR EQUIPMENT OR PERSONNEL ENTRY TO WORK AREAS OUTSIDE THE EXCLUSION ZONE. DURING ACTIVE USE GATE WILL BE ATTENDED BY A CLEARCREEK EMPLOYEE.
5. PERSONS ENTERING THE EXCLUSION ZONE WILL BE THROUGH THE INDICATED PERSONNEL GATE ENTRANCE AND WILL WEAR AT A MINIMUM PPE PER REQUIREMENTS OF CLEARCREEK CONTRACTORS SSHASP. WORKERS ENTERING THE EXCLUSION ZONE AND IN POTENTIAL CONTACT WITH CONTAMINATED SOILS OR AIR MUST HAVE MINIMUM 40-HOUR HAZWOPER TRAINING AND CURRENT 8-HOUR REFRESHER COURSE. WORKERS WILL BE ALLOWED IN THE EXCLUSION ZONE WITH MINIMUM 24-HOUR OSHA TRAINING PROVIDED AIR MONITORING INDICATES SAFE BREATHING ZONE CONDITIONS AND WORKER PERFORMS NO DIRECT HANDLING OF CONTAMINATED MATERIALS. VISITORS MAY ENTER THE SITE IF ESCORTED BY AN AUTHORIZED REPRESENTATIVE OF JORGENSEN FORGE, BOEING OR CLEARCREEK.
6. ONE 20,000 GALLON STORAGE/WEIR TANK AND TRANSFER PIPELINE INSTALLED DURING STEP 2 TO TRANSFER AND STORE CONTAMINATED GROUNDWATER GENERATED DURING DRILLED SHAFT INSTALLATION (SEE FIGURE 2). THIS TANK AND PIPELINE WILL BE INCORPORATED IN THE DEWATERING TREATMENT SYSTEM.

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STEP 3
Site Controls For
Subtitle D
Soil Excavation

FIG. 3

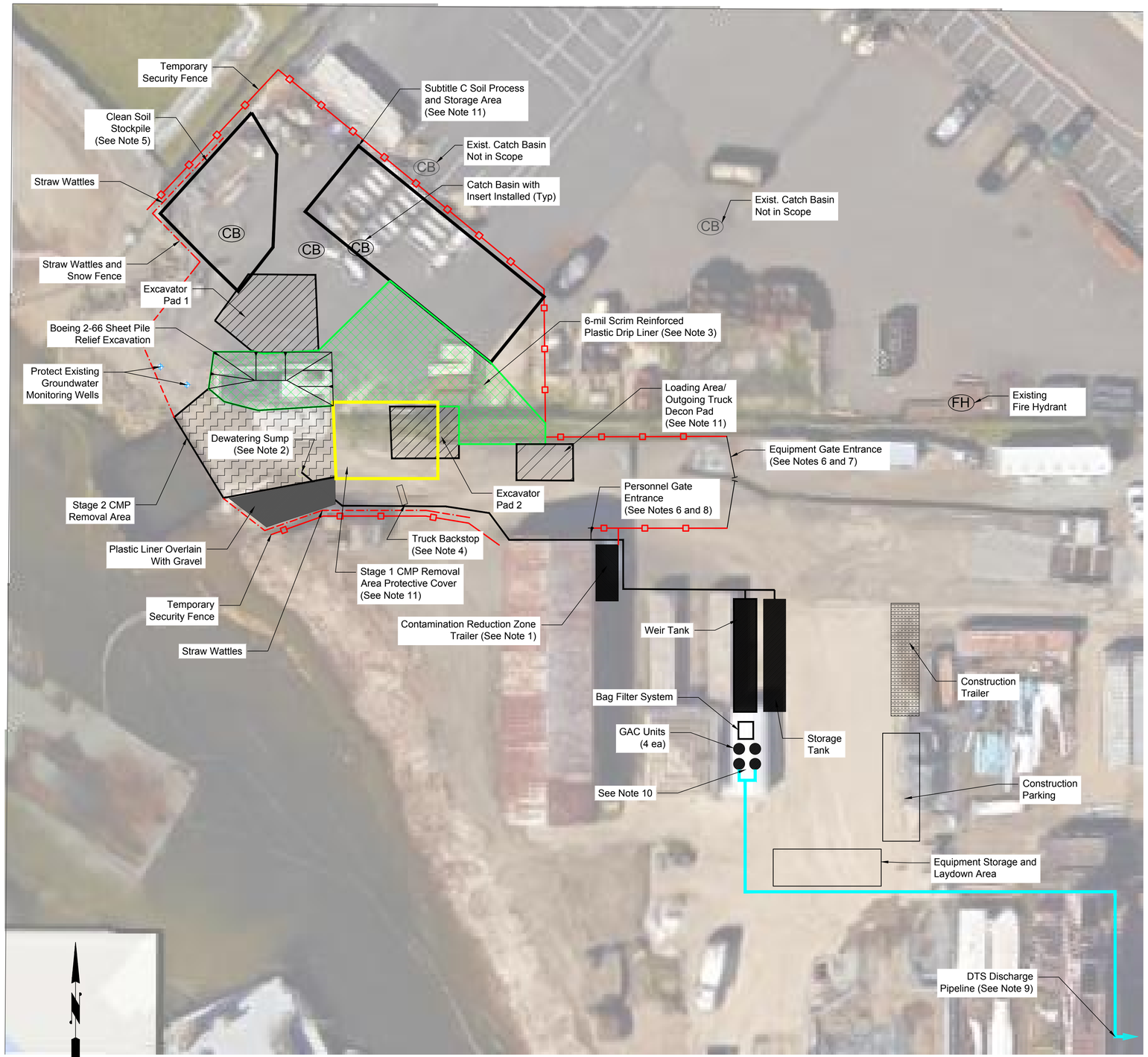

FIGURE 4

SCALE: 1" =20'

4

0 10' 20' 40'

NOTES:

1. A HAZWOPER EXCLUSION ZONE WILL BE ESTABLISHED DURING STEP 4 - SITE CONTROLS FOR SUBTITLE C SOIL EXCAVATION. ALL PERSONNEL ENTERING AREA BOUNDED BY TEMPORARY FENCE SURROUNDING SITE SHALL DO SO THROUGH THE CRZ FACILITY. SEE ALSO NOTE 8 FOR TRAINING AND PPE REQUIREMENTS FOR EXCLUSION ZONE ENTRY.
2. A DEWATERING SUMP OR SUMPS WILL BE INSTALLED TO DEWATER SOILS DOWN TO ELEVATION -4 PRIOR TO EXCAVATION.
3. PLACE 6-MIL SCRIM REINFORCED PLASTIC DRIP LINER UNDER EQUIPMENT SWING PATH. ADJUST LOCATION AS NEEDED TO PREVENT ANY SOIL OR DRIPPINGS FROM CONTACTING PAVEMENT OR GROUND SURFACE. REMOVE SIGNIFICANT SPILLAGE ON PLASTIC WITH SHOVELS OR APPROPRIATE MEANS AND PLACE IN SUBTITLE C SOIL PROCESS AND STORAGE AREA. VACTOR CONTAMINATED SOIL AND MOISTURE FROM PLASTIC SURFACE, IF APPROPRIATE. AT COMPLETION OF EXCAVATION, CAREFULLY FOLD PLASTIC INWARD TO CONTAIN REMAINING CONTAMINATED SOIL AND MOISTURE AND DISPOSE TO SUBTITLE D FACILITY.
4. A TRUCK BACKSTOP CONSTRUCTED OF TWO STACKED ECOLOGY BLOCKS WILL BE POSITIONED TO PREVENT TRUCKS FROM BACKING ONTO EMJ REMEDIATION SITE.
5. INSTALL ECOLOGY BLOCKS AROUND PERIMETER OF CLEAN SOIL STOCKPILE.
6. ENTRYWAYS WILL BE KEPT SECURED WITH PADLOCK AND CHAIN DURING NON-WORKING PERIODS.
7. EQUIPMENT ENTRY GATES WILL REMAIN LOCKED UNLESS REQUIRED TO BE OPENED FOR EQUIPMENT ENTRY. DURING ACTIVE USE GATE WILL BE ATTENDED BY A CLEARCREEK EMPLOYEE.
8. PERSONS ENTERING THE SECURED AREA WILL BE THROUGH THE INDICATED PERSONNEL GATE ENTRANCE AND WILL WEAR AT A MINIMUM PPE PER REQUIREMENTS OF CLEARCREEK CONTRACTORS SSHASP. WORKERS ENTERING THE EXCLUSION ZONE AND IN POTENTIAL CONTACT WITH CONTAMINATED SOILS OR AIR MUST HAVE MINIMUM 40-HOUR HAZWOPER TRAINING AND CURRENT 8-HOUR REFRESHER COURSE. WORKERS WILL BE ALLOWED IN THE EXCLUSION ZONE WITH MINIMUM 24-HOUR OSHA TRAINING PROVIDED AIR MONITORING INDICATES SAFE BREATHING ZONE CONDITIONS AND WORKER PERFORMS NO DIRECT HANDLING OF CONTAMINATED MATERIALS. VISITORS ENTERING THE SITE MUST HAVE MINIMUM 24-HR OSHA TRAINING AND BE ESCORTED BY AN AUTHORIZED REPRESENTATIVE OF JORGENSEN FORGE, BOEING OR CLEARCREEK.
9. EXTEND DTS SYSTEM DISCHARGE LINE (4" LAY FLAT HOSE OR HDPE PIPING) TO KCIW PERMITTED DISCHARGE SEWER LOCATION. DISCHARGE POINT IS APPROXIMATELY 300 FEET SE OF ARROW POINT. PROTECT DISCHARGE LINE WITH RAMPS AT TRAFFIC CROSSINGS.
10. FOR DEWATERING TREATMENT DETAILS, SEE FIGURE 13 AND SECTION 7 OF THE WORK PLAN.
11. SEE FIGURE 6 FOR DETAILS OF SUBTITLE C SOIL PROCESS AND STORAGE AREA, LOADING AREA/OUTGOING TRUCK DECON PAD, AND STAGE 1 CMP REMOVAL AREA PROTECTIVE COVER.

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STEP 4
Site Controls For Subtitle C Soil Excavation

FIG. 4

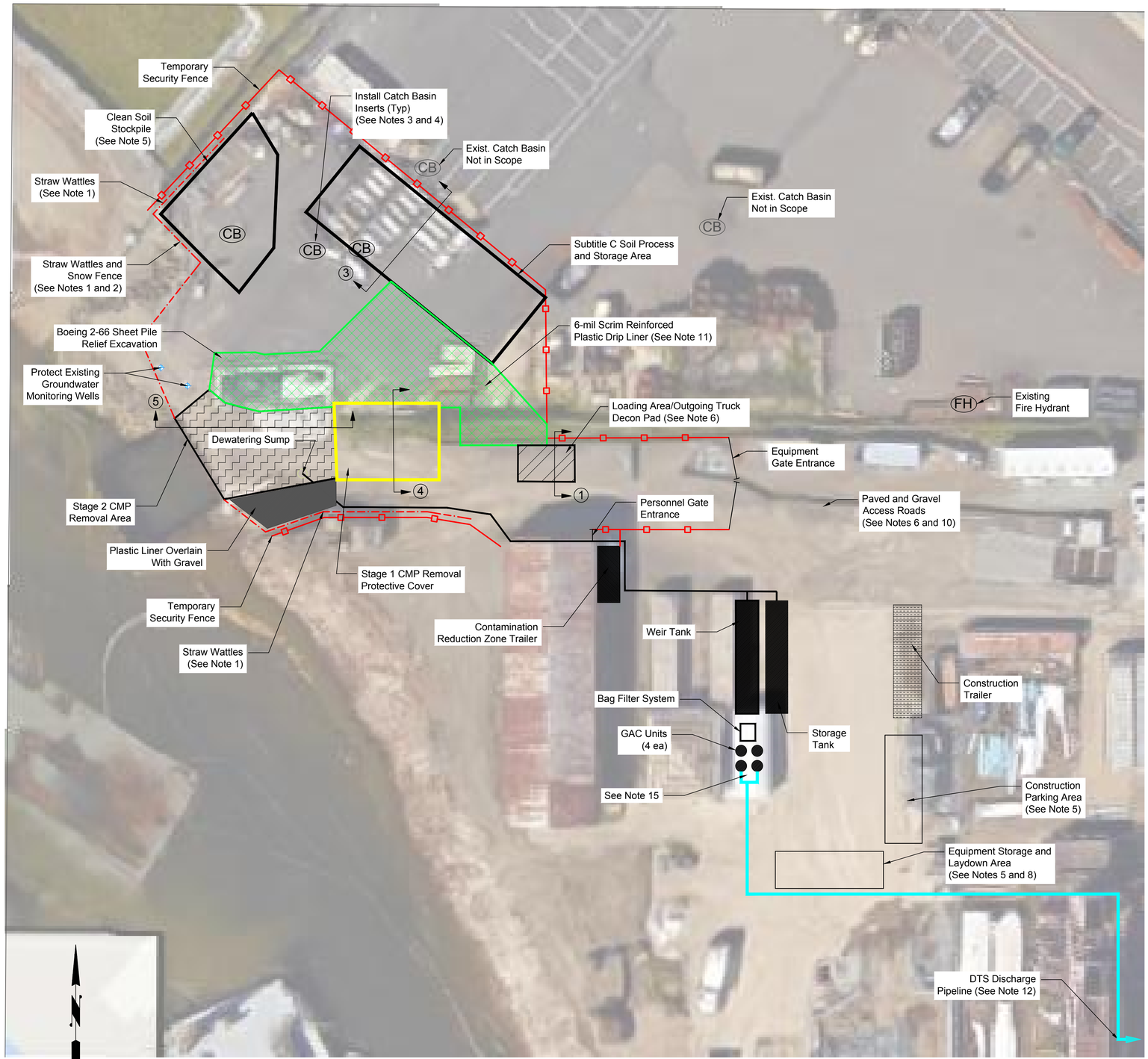

FIGURE 5

5

0 10' 20' 40'

TEMPORARY EROSION AND SEDIMENT CONTROL (TESC):

1. STRAW WATTLES TO BE PROVIDED AND INSTALLED IN ACCORDANCE WITH ECOLOGY'S BMP C235. BACK WATTLES WITH FENCING INSTEAD OF STAKES ON PAVEMENT OR ROCK SURFACES.
2. HIGH VISIBILITY (SAFETY) FENCING TO BE PROVIDED NEAR THE TOP OF SLOPE AND INSTALLED IN ACCORDANCE WITH ECOLOGY'S BMP C103.
3. CATCH BASIN INLET PROTECTION TO BE PROVIDED IN CATCH BASINS POTENTIALLY IMPACTED BY WORK. INLET PROTECTION TO BE INSTALLED IN ACCORDANCE WITH ECOLOGY'S BMP C220.
4. CLEAN APPLICABLE STORM CATCH BASIN/STRUCTURES AND REMOVE SEDIMENTS PRIOR TO ANY EARTH DISTURBING ACTIVITIES AND DURING DEMOBILIZATION.
5. PROVIDE CONSTRUCTION ROADS AND PARKING AREA STABILIZATION IN ACCORDANCE WITH ECOLOGY'S BMP C107.
6. A SEPARATE CONSTRUCTION ENTRANCE IS NOT REQUIRED. THE INTENT OF A CONSTRUCTION ENTRANCE/EXIT IN ACCORDANCE WITH ECOLOGY'S BMP C105 TO BE MET USING CONTROLLED TRUCK LOAD OUT AND EXISTING GRAVEL AND PAVED ACCESS ROUTES.
7. PROVIDE DUST CONTROL AS APPLICABLE IN ACCORDANCE WITH ECOLOGY'S BMP C140.
8. HAVE APPROPRIATE EROSION CONTROL MATERIALS ON HAND AND LOCATED IN THE CONTRACTOR'S AREA IN ACCORDANCE WITH ECOLOGY'S BMP C150.
9. PROVIDE MATERIAL DELIVERY, STORAGE, AND CONTAINMENT IN THE CONTRACTOR'S AREA IN ACCORDANCE WITH ECOLOGY'S BMP C153.
10. THE CONTRACTOR WILL NOT ALLOW SEDIMENT TO BE TRACKED ONTO PAVED STREETS OR ROADWAYS THROUGH IMPLEMENTATION OF TESC MEASURES.
11. PROVIDE PLASTIC FOR DRIP PAD BENEATH SWING PATH OF EXCAVATION EQUIPMENT. ADJUST LOCATION OF DRIP PADS AS NEEDED FOR COVERAGE.
12. EXTEND DTS SYSTEM DISCHARGE LINE TO KCIW PERMITTED DISCHARGE SEWER LOCATION. DISCHARGE POINT IS APPROXIMATELY 300 FEET SE OF ARROW POINT. PROTECT DISCHARGE LINE WITH RAMPS AT TRAFFIC CROSSINGS.
13. SEE FIGURE 6 FOR DETAIL SECTIONS 1, 3 AND 4.
14. SEE FIGURES 9 THROUGH 12 FOR SEQUENTIAL EXCAVATION OF STAGE 2 CMP REMOVAL AREA AT DETAIL SECTION 5 LOCATION.
15. FOR DEWATERING TREATMENT DETAILS, SEE FIGURE 13 AND SECTION 7 OF THE WORK PLAN.

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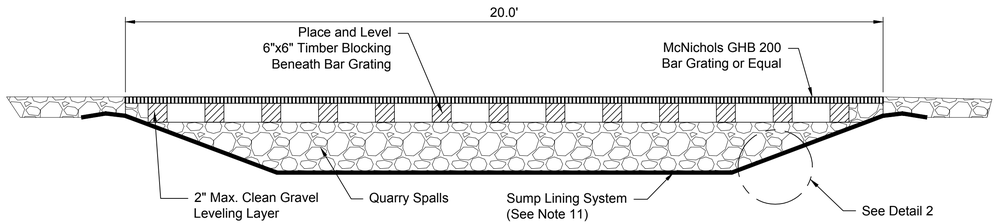
TESC Plan

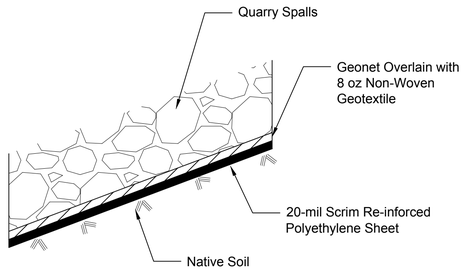
FIG. 5



LOADING AREA/OUTGOING TRUCK DECON PAD

SCALE: NTS

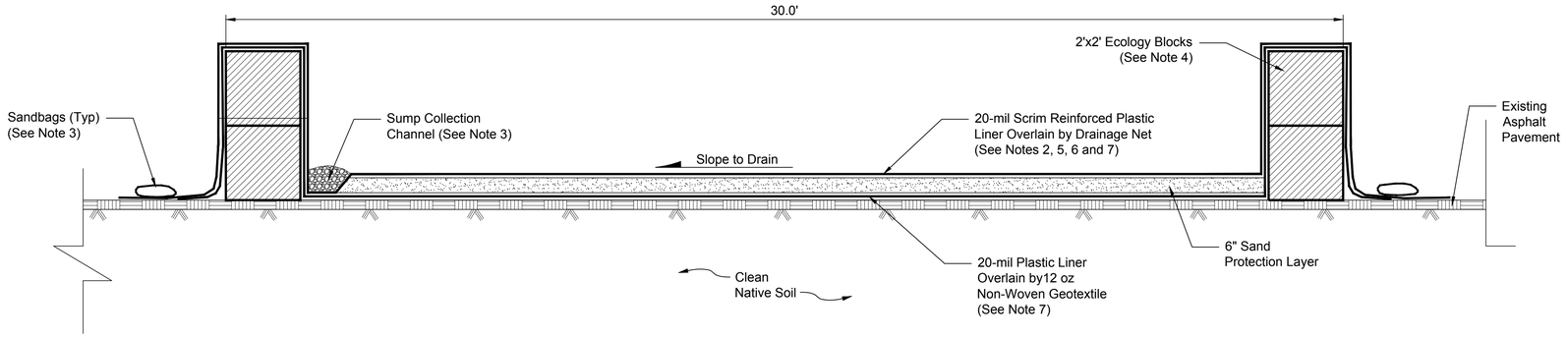
1 FIG. 5



LOADING AREA/OUTGOING TRUCK DECON PAD

SCALE: NTS

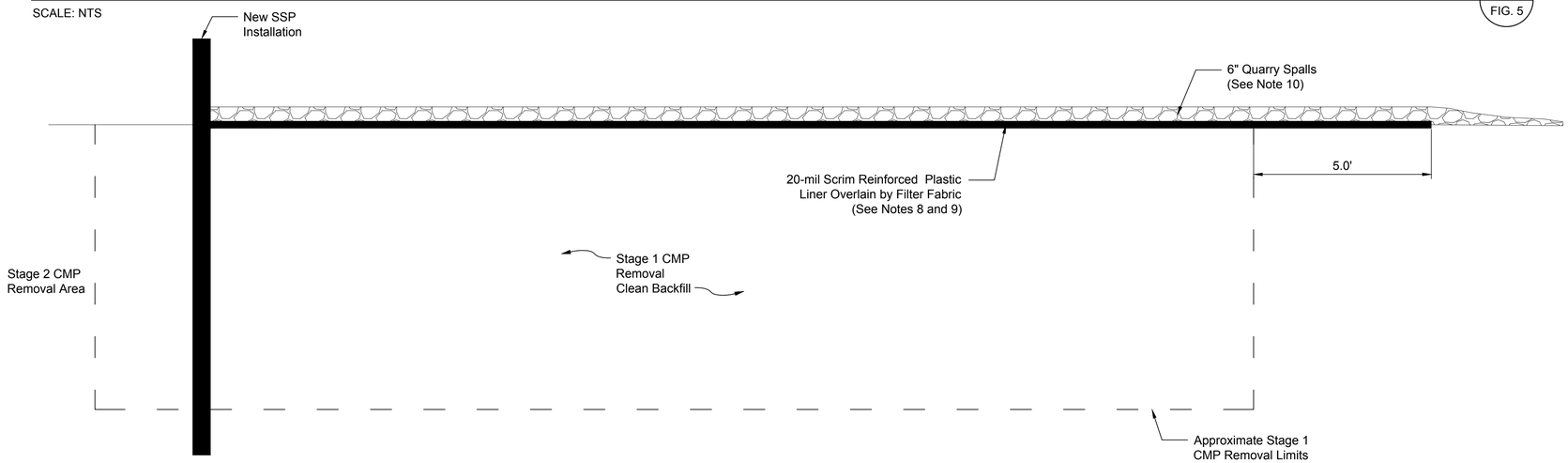
2 FIG. 6



SUBTITLE C SOIL PROCESS AND STORAGE AREA

SCALE: NTS

3 FIG. 5



STAGE 1 CMP REMOVAL AREA PROTECTION

SCALE: NTS

4 FIG. 5

NOTES:

1) FOR DETAIL SECTION LOCATIONS, SEE FIGURE 5.
2) INSTALL 4 EACH 8'X12' STEEL PLATES ON A 4" TO 6" LAYER OF SAND PLACED OVER UPPER PLASTIC LINER FOR PROTECTION DURING MATERIAL PROCESS AND LOAD OUT. TACK WELD STEEL PLATES TOGETHER. INSTALL STEEL PLATES BEFORE PLACEMENT OF SUBTITLE C SOIL IN THE FACILITY.
3) PLACE DRAIN GRAVEL IN SUMP COLLECTION CHANNEL. INSTALL MINIMUM 8" DIAMETER SLOTTED PVC RISER AT LOW SPOT OF SUMP COLLECTION CHANNEL TO FACILITATE REMOVAL OF DRAINAGE WITH SUMP PUMP. PUMP DRAINAGE TO DEWATERING TREATMENT SYSTEM FOR TREATMENT AND DISCHARGE.
4) PLACE ECOLOGY BLOCKS (AVAILABLE ON JORGENSEN FORGE PROPERTY) AROUND PERIMETER OF SUBTITLE C SOIL PROCESS AND STORAGE AREA. BLOCKS WILL BE STACKED A MINIMUM OF 2 HIGH, BUT UP TO 3 HIGH TO PROVIDE SUFFICIENT STORAGE CAPACITY. LAP GEOSYNTHETIC MATERIALS OVER ECOLOGY BLOCKS AND ANCHOR WITH SAND BAGS PLACED AT APPROXIMATE 10' SPACING.
5) AT COMPLETION OF WASTE PROCESS AND LOAD OUT OPERATIONS, REMOVE UPPER PLASTIC LINER AND DRAIN NET. DISPOSE THESE MATERIALS TO SUBTITLE D LANDFILL.
6) INSTALL CLEAN PLASTIC LINER OVERLAIN BY 6" SAND LAYER PRIOR TO USE OF LINED AREA FOR EQUIPMENT DECONTAMINATION. SUBTITLE C PROCESS AND STORAGE AREA MAY BE USED FOR INTERIM EQUIPMENT DECONTAMINATION PROVIDED EQUIPMENT BASE DOES NOT PHYSICALLY ENTER LINED PROCESS AREA (I.E. PRESSURE WASH EXCAVATOR BUCKET WHILE SUSPENDED OVER SOIL PROCESS AREA).
7) AT COMPLETION OF DECONTAMINATION ACTIVITIES IN LINED AREAS, SAND OR GRAVEL LAYERS AND GEOSYNTHETICS WILL BE DISPOSED IN SUBTITLE D FACILITY.
8) MOVE EXISTING ROCK IN STAGE 1 CMP REMOVAL AREA AND STOCKPILE. PLACE 20-MIL REINFORCED PLASTIC LINER OVERLAIN BY 12 OZ. FILTER FABRIC AS SHOWN ON FIGURE.
9) EXTEND PLASTIC LINER TO MINIMUM 5' BEYOND LIMITS OF STAGE 1 CMP REMOVAL AREA IN ALL DIRECTIONS EXCEPT WHERE IT OVERLAPS STAGE 2 CMP REMOVAL AREA.
10) COVER PLASTIC LINER AND FILTER FABRIC WITH 6" LAYER OF STOCKPILED ROCK AND QUARRY SPALLS. FEATHER QUARRY SPALLS TO EXISTING GRADE AT EDGE OF COVER INSTALLATION.
11) A 6" PVC RISER SURROUNDED BY DRAIN GRAVEL MATERIAL WILL BE INSTALLED IN THE SOUTHEAST CORNER OF THE LOADING AREA/OUTGOING TRUCK DECON PAD. WATER WILL PERIODICALLY BE PUMPED TO DRAIN THE QUARRY SPALLS AND TRANSPORTED TO THE DTS FOR TREATMENT AND DISPOSAL.

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(360) 659-2459

JORGENSEN FORGE OUTFALL SITE
STAGE 2 CMP REMOVAL

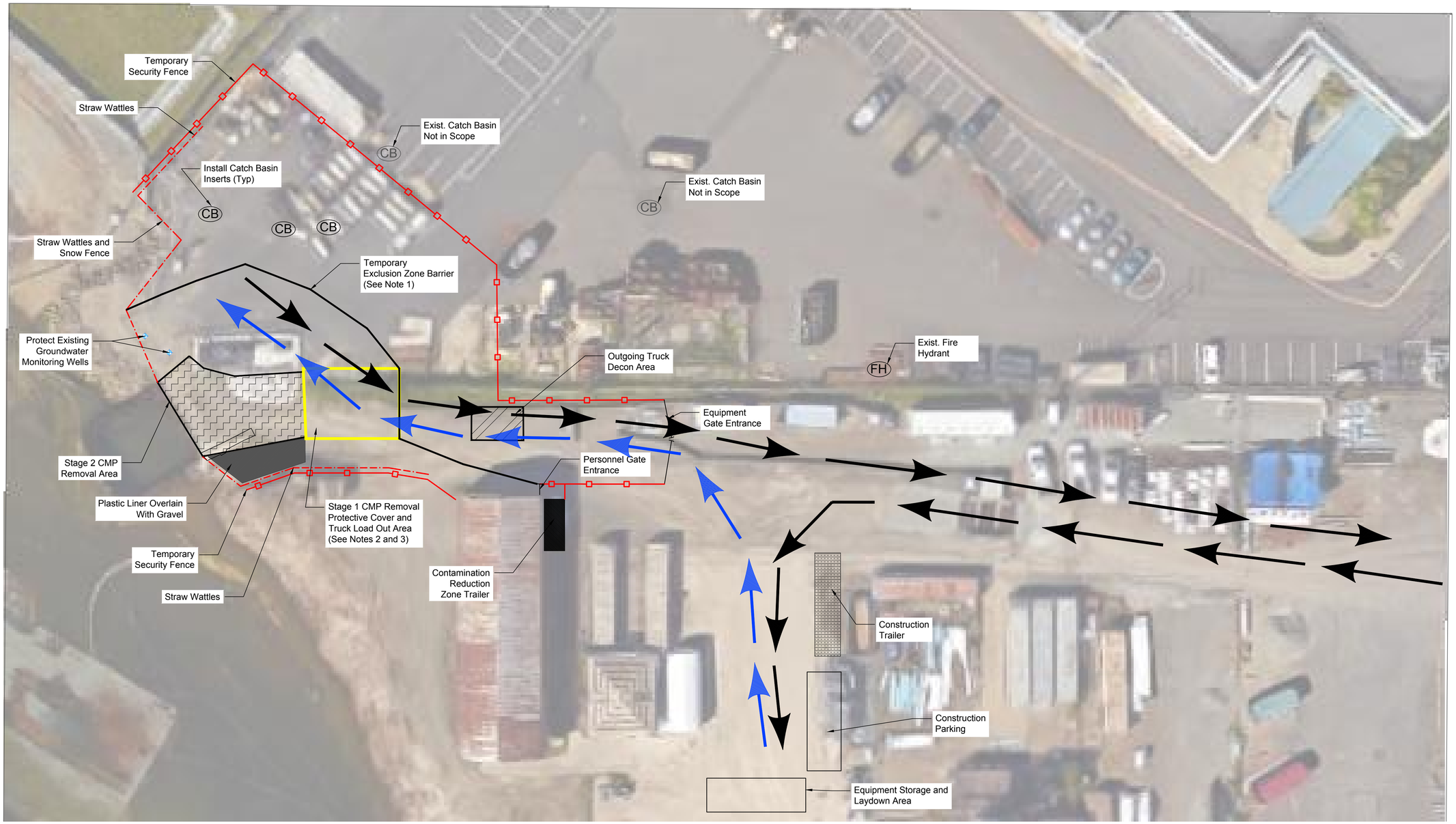
8501 E. Marginal Way South
Tukwila, WA. 98108

Revision	Date

Project No:	XXXX.XX
Date:	2016.07.15
Drawn By:	DH
Checked By:	DH

Protection and Containment Facility Details

FIG. 6



NOTES:

1) AN EXCLUSION ZONE WILL BE ESTABLISHED DURING STEP 3 - SITE CONTROLS FOR SUBTITLE D SOIL EXCAVATION. THE AREA WILL BE EXPANDED TO ACCOMMODATE TRUCKS POSITIONED DURING SUBTITLE D LOADING OPERATIONS.
2) A PROTECTIVE COVER WILL BE INSTALLED OVER THE STAGE 1 CMP REMOVAL AREA. TRUCK BEDS AND TRAILERS WILL BE BACKED ONTO THIS AREA FOR LOADING SUBTITLE D MATERIAL.
3) TRUCKS WILL BE INSPECTED AND DECONTAMINATED AS NECESSARY ON THE TRUCK DECON PAD BEFORE LEAVING THIS AREA.

Legend

Traffic Flow Driving Forward

Traffic Flow Driving In Reverse

FIGURE 7

SCALE: 1" =20'

7

0 10' 20' 40'

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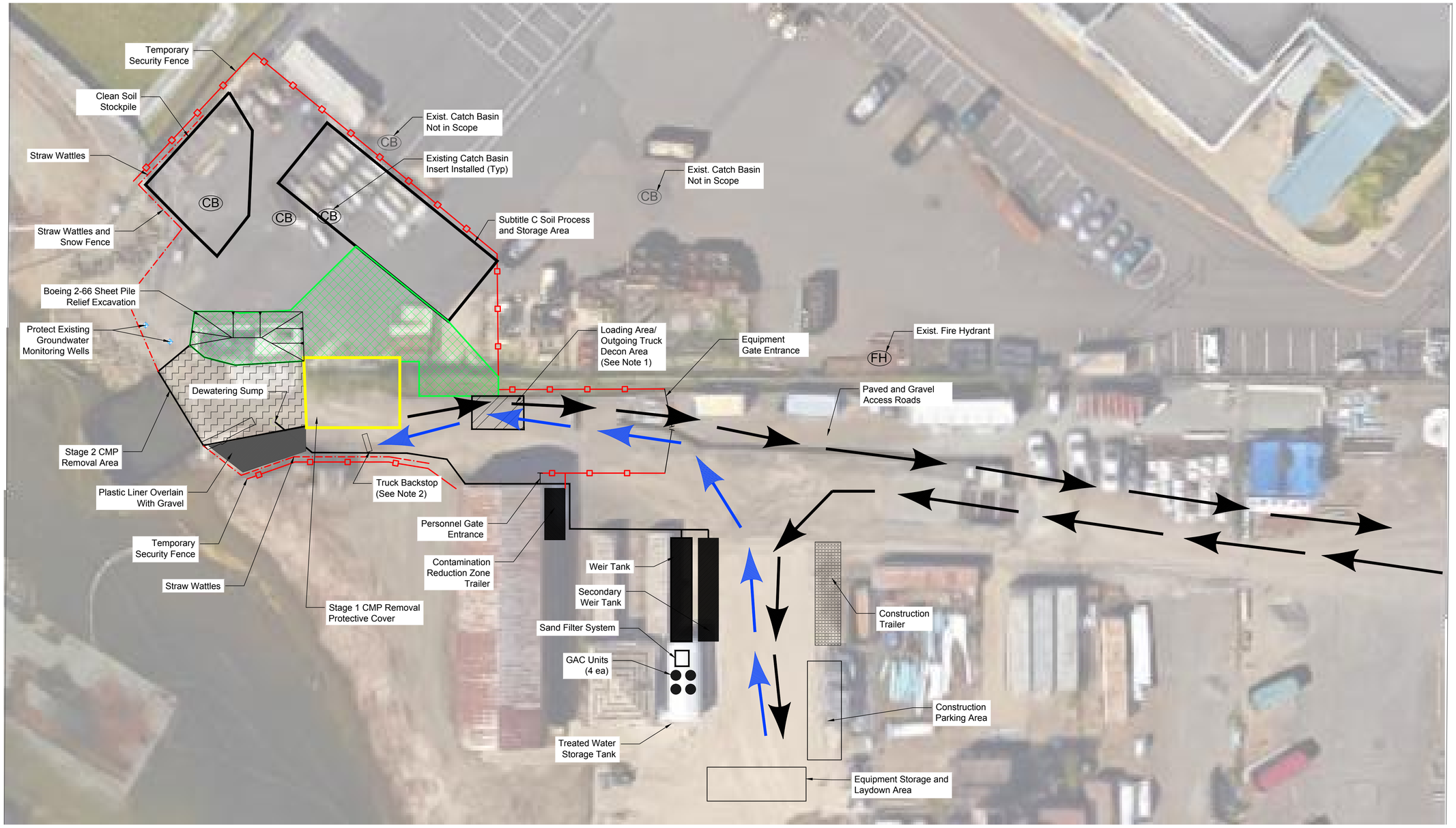
Checked By:	DH

Traffic Flow During Subtitle D Soil Excavation

FIG. 7



NOTES:

1) TRUCK BEDS AND TRAILERS WILL BE BACKED ONTO THE LOADING AREA/OUTGOING TRUCK DECON AREA FOR LOADING SUBTITLE C MATERIAL. TRUCKS WILL BE INSPECTED AND DECONTAMINATED AS NECESSARY BEFORE LEAVING THE LOADING AREA.
2) A TRUCK BACKSTOP CONSTRUCTED OF TWO STACKED ECOLOGY BLOCKS WILL BE POSITIONED TO PREVENT TRUCKS FROM BACKING ONTO EMJ REMEDIATION SITE. CLEAN TRUCK TRAILERS WILL BE BACKED UP TO THIS POINT WHILE THE TRUCK BED IS BEING LOADED. AFTER THE BED IS LOADED, THE TRUCK WILL PULL FORWARD TO POSITION THE TRAILER ON THE LOADING AREA.

Legend

Traffic Flow Driving Forward

Traffic Flow Driving In Reverse

FIGURE 8

SCALE: 1" =20'

8

0 10' 20' 40'

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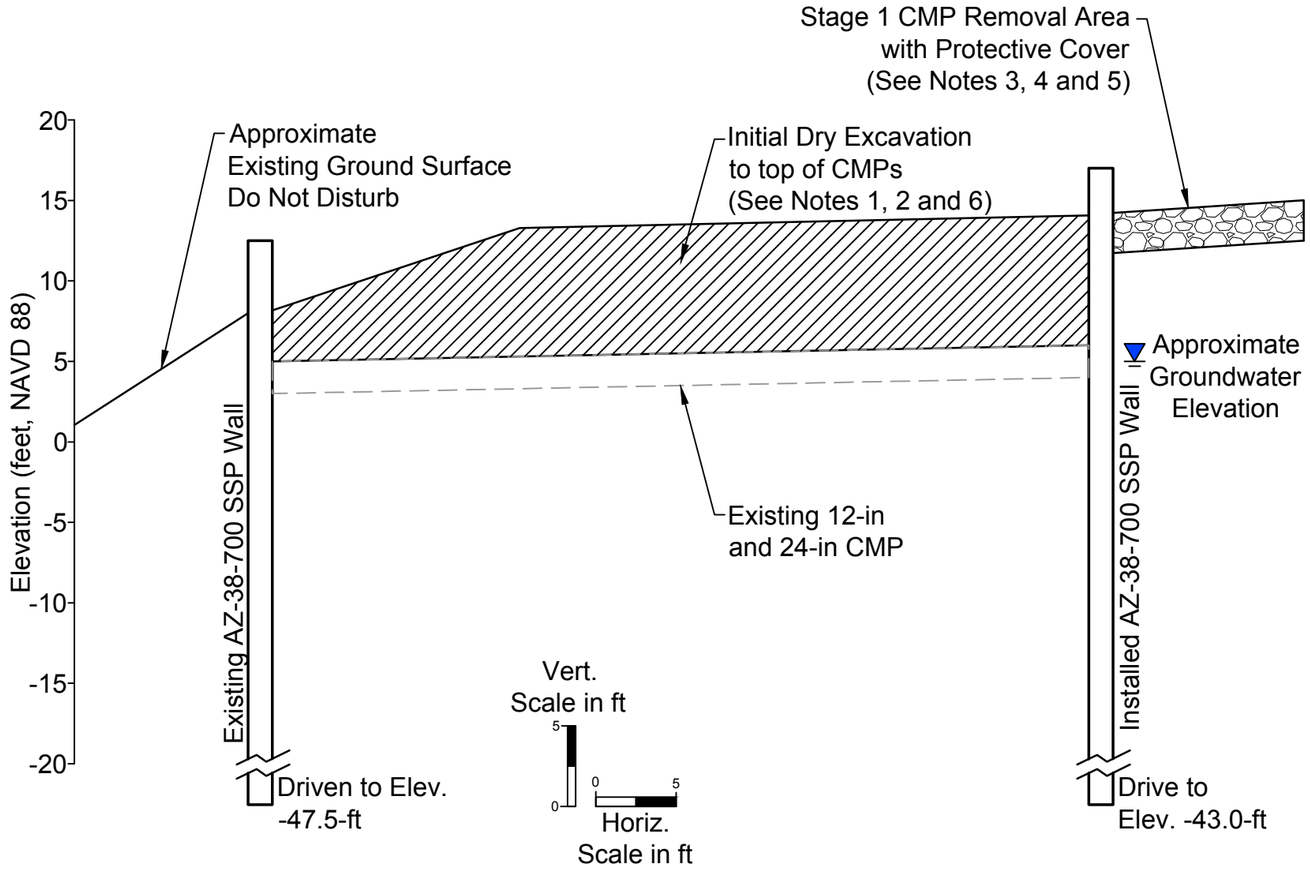
Checked By:	DH

Traffic Flow During Subtitle C Soil Excavation

FIG. 8



NOTES:

1) MATERIAL ABOVE THE EXISTING CMP PIPELINES HAS BEEN TESTED AND IS PRE-CLASSIFIED AS SUBTITLE D MATERIAL. CONTRACTOR WILL STOP PHASE 1 EXCAVATION AT OR ABOVE TOP OF EXISTING PIPES.
2) EXCAVATOR WILL REMOVE SUBTITLE D SOIL WHILE POSITIONED ATOP EXCAVATION AREA WORKING FROM WEST TO EAST.
3) TRUCKS WILL BE BACKED ONTO A DESIGNATED TRUCK LOAD OUT AREA LOCATED ON THE STAGE 1 PROTECTIVE COVER. SEE FIGURE 3 FOR LOCATION.
4) TRUCKS MAY BE DIRECT LOADED FOR DISPOSAL .
5) TRUCKS WILL BE INSPECTED AND DECONTAMINATED ON THE TRUCK LOAD OUT AREA. PROTECTIVE COVER FOR STAGE 1 CMP REMOVAL AREA WILL BE CONSTRUCTED AS SHOWN ON FIGURE 6.
6) INSTALL SSP STRUCTURAL SUPPORT ALONG BOEING 2-66 SSP PER SPECIFICATION SECTION 314116 AT COMPLETION OF PHASE 1 EXCAVATION.

East - West SectionThrough Stage 2 Excavation Area

5
FIG. 5

FIGURE 9
Excavation Sequence Phase 1

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STAGE 2 CMP REMOVAL
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Tukwila, WA 98108

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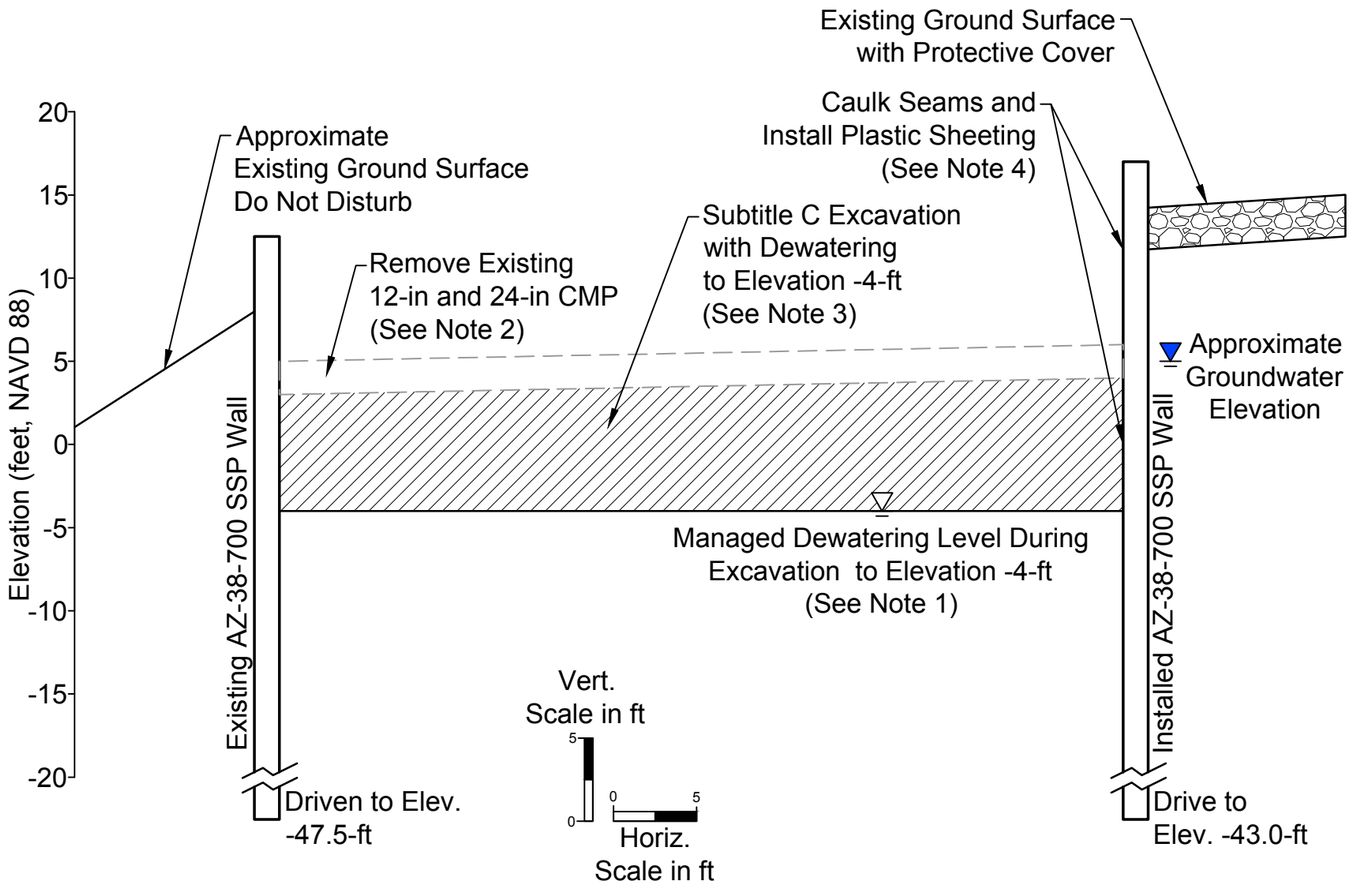

NOTES:

1) SUMPS WILL BE INSTALLED AND PHASE 2 EXCAVATION MATERIAL DEWATERED TO ELEVATION -4.
2) CMP PIPES WILL BE CRUSHED OR SEGMENTED IN THE EXCAVATION AREA AND REMOVED FOR SUBTITLE C DISPOSAL.
3) PHASE 2 SOIL MATERIAL WILL BE EXCAVATED AND PLACED DIRECTLY IN THE SUBTITLE C SOIL PROCESS AND STORAGE AREA FOR MOISTURE REMOVAL AND PAINT FILTER TESTING.
4) AT COMPLETION OF PHASE 2 SOIL EXCAVATION, APPLY CAULKING TO PILE JOINTS WHERE VISUAL STEADY STREAMS OR WATER ARE OBSERVED. TAPE JOINTS AND COVER EXPOSED SSP FACE WITH PLASTIC PER SPECIFICATION SECTION 026123, PARAGRAPH 3.12.

East - West SectionThrough Stage 2 Excavation Area

5
FIG. 5

FIGURE 10
Excavation Sequence Phase 2

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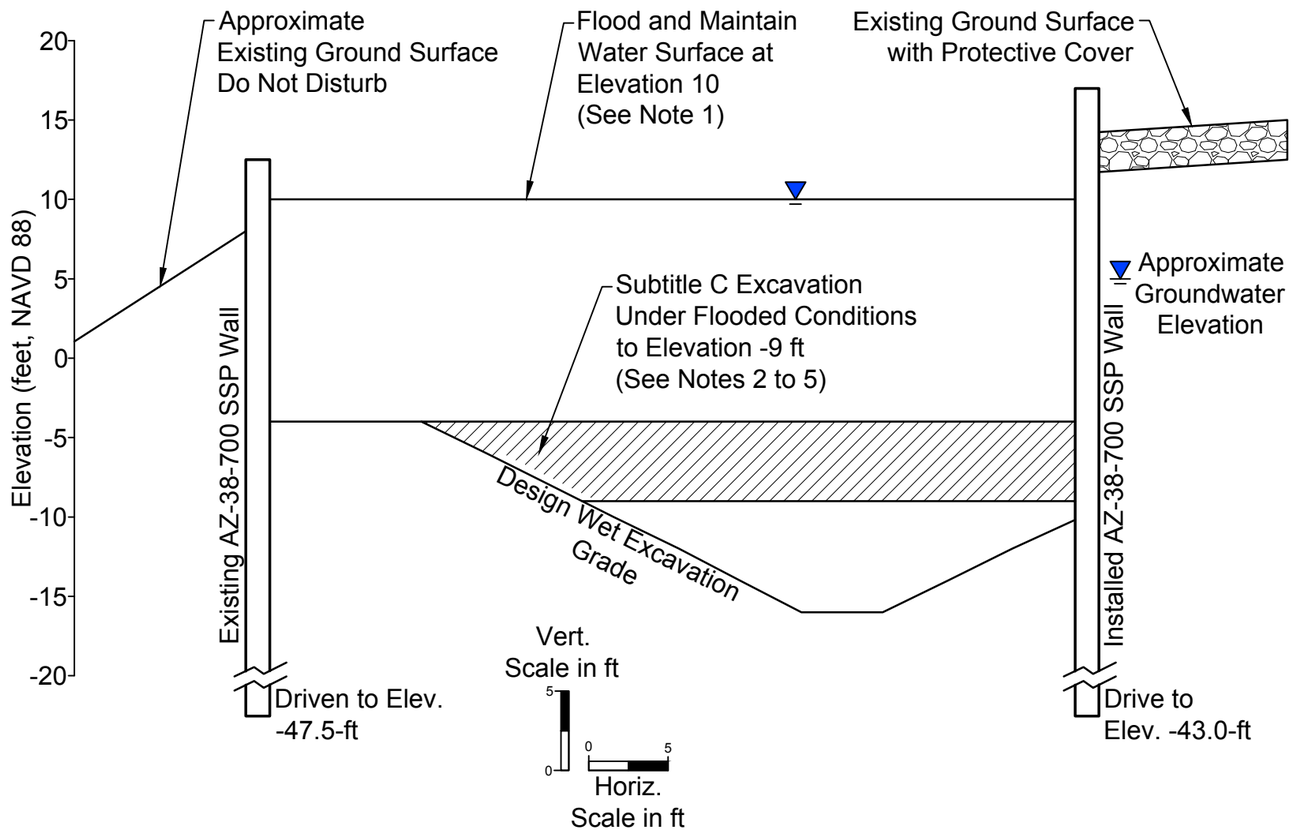

NOTES:

1) PRIOR TO PHASE 3 SOIL EXCAVATION, FLOOD AREA WITHIN SSP LIMITS TO ELEVATION 10 AND MAINTAIN WATER ELEVATION AT THIS ELEVATION THROUGHOUT REMAINDER OF EXCAVATION. CONTINUE TO MAINTAIN FLOODED CONDITIONS UNTIL BACKFILL REACHES ELEVATION 5.
2) EXCAVATE MATERIAL WITH LONG REACH EXCAVATOR OR CRANE WITH DRAINING BUCKET. HOLD MATERIAL OVER EXCAVATION FOR 1 MINUTE PRIOR TO MOVING EXCAVATOR BUCKET OUTSIDE LIMITS OF SHEET PILE CONTAINMENT AREA.
3) PROTECT SURFACES UNDER EXCAVATOR SWING PATH WITH DRIP PAD AS SHOWN ON FIGURE 4 AND PLACE EXCAVATED SOIL DIRECTLY IN SUBTITLE C SOIL PROCESS AND STORAGE AREA FOR ADDITIONAL DRAINAGE.
4) SOIL MATERIAL MAY BE LOADED OUT FOR DISPOSAL TO SUBTITLE C FACILITY AFTER IT PASSES PAINT FILTER TESTING.
5) STOP PHASE 3 EXCAVATION AT ELEVATION -9 AND APPLY FLOCCULENT PER SPECIFICATION SECTION 026124, PARAGRAPH 3.7. WAIT UNTIL FLOCCULATION HAS OCCURRED UP TO A MAXIMUM 24-HOURS.

East - West SectionThrough Stage 2 Excavation Area

5
FIG. 5

FIGURE 11
Excavation Sequence Phase 3

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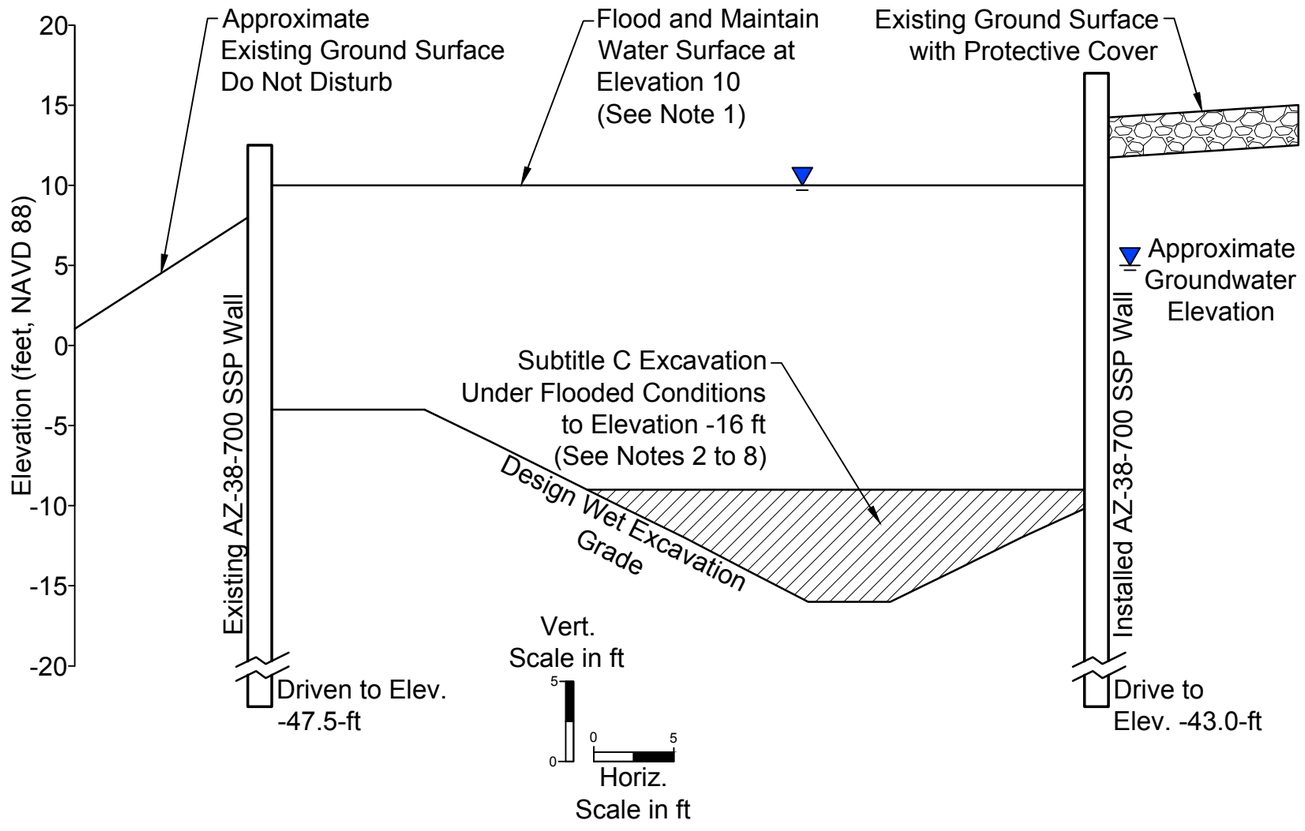

NOTES:

1) MAINTAIN FLOODED CONDITIONS WITHIN SSP LIMITS AT ELEVATION 10.
2) CONTINUE EXCAVATING MATERIAL FROM ELEVATION -9 TO -16 WITH LONG REACH EXCAVATOR OR CRANE WITH DRAINING BUCKET. HOLD MATERIAL OVER EXCAVATION FOR 1 MINUTE PRIOR TO MOVING EXCAVATOR BUCKET OUTSIDE LIMITS OF SHEET PILE CONTAINMENT AREA.
3) PROTECT SURFACES UNDER EXCAVATOR SWING PATH WITH DRIP PAD AS SHOWN ON FIGURE 4 AND PLACE EXCAVATED SOIL DIRECTLY IN SUBTITLE C SOIL PROCESS AND STORAGE AREA FOR ADDITIONAL DRAINAGE.
4) SOIL MATERIAL MAY BE LOADED OUT FOR DISPOSAL TO SUBTITLE C FACILITY AFTER IT PASSES PAINT FILTER TESTING.
5) STOP PHASE 4 EXCAVATION AT DESIGN CONTOURS AND APPLY FLOCCULENT PER SPECIFICATION SECTION 026124, PARAGRAPH 3.7. WAIT UNTIL FLOCCULATION HAS OCCURRED UP TO A MAXIMUM 24-HOURS. CLEAN BOTTOM OF EXCAVATION WITH EXCAVATOR BUCKET.
6) AFTER BOTTOM CLEANING, JORGENSEN FORGE/BOEING WILL OBTAIN CONFIRMATION SAMPLES.
7) IF CONFIRMATION SAMPLES DO NOT SHOW REMEDIATION GOALS ARE MET, CONTINUE EXCAVATION AT DIRECTION OF JORGENSEN FORGE/BOEING
8) ONCE TESTING SHOWS REMEDIATION GOALS ARE MET, BEGIN BACKFILL OPERATIONS IN ACCORDANCE WITH SPECIFICATION SECTION 312323.

East - West SectionThrough Stage 2 Excavation Area

5
FIG. 5

FIGURE 12
Excavation Sequence Phase 4

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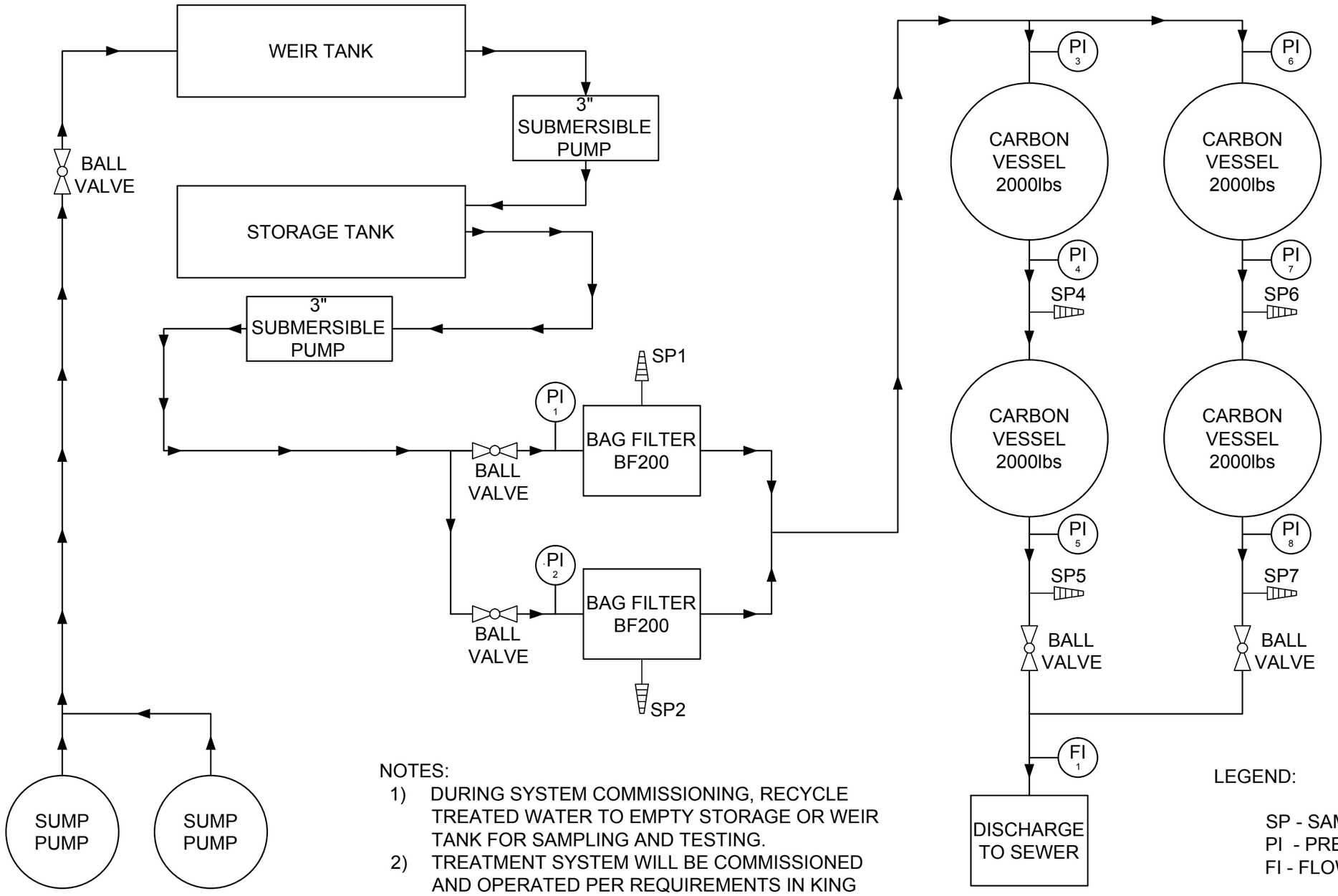

NOTES:

1) DURING SYSTEM COMMISSIONING, RECYCLE TREATED WATER TO EMPTY STORAGE OR WEIR TANK FOR SAMPLING AND TESTING.
2) TREATMENT SYSTEM WILL BE COMMISSIONED AND OPERATED PER REQUIREMENTS IN KING COUNTY INDUSTRIAL WASTE MAJOR DISCHARGE AUTHORIZATION 4377-01

LEGEND:

SP - SAMPLE PORT
PI - PRESSURE INDICATOR
FI - FLOW INDICATOR

FIGURE 13
Waste Treatment System 200 Gallons Per Minute

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JORGENSEN FORGE OUTFALL SITE
STAGE 2 CMP REMOVAL
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Tukwila, WA 98108

Clearcreek CONTRACTORS Environmental/Civil

ATTACHMENT 1

SITE SPECIFIC HEALTH AND SAFETY PLAN

SITE SPECIFIC HEALTH & SAFETY PLAN

For Project:

Jorgensen Forge Outfall Pipe Removal/ Cleanup

Project No. 215119
8531 E Marginal Way S
Seattle, WA

Prepared for:

Clearcreek Contractor Personnel

Prepared by:

Clearcreek Contractors, Inc.
3919 88th Street NE
Marysville, WA 98270
Clearcreek Project No. 215119

1. INTRODUCTION

Clearcreek Contractors has entered into contract with Jorgensen Forge Corp to perform environmental construction services at the property located at 8531 E Marginal Way, Seattle, WA. The scope of this project is to remove contaminated soils and abandoned corrugated metal pipes (CMPs) near an abandoned outfall in the northwest corner of the Jorgensen Forge property. The pipes are to be removed and the excavation extended to depths over 30 feet to remove PCB contaminated soils from within the Stage 2 CMP Removal limits. The excavation will be contained and supported with steel sheet pile (SSP).

The scope of work consists of the following:

- Mobilization/Site Setup
- Providing hygiene and sanitation facilities (personnel decontamination)
- Establishing site security (e.g., fencing, cones, tape, barricades, etc.)
- Establishing exclusion zone, contaminate reduction zone and support zone
- Installing Temporary Erosion and Sediment Control (TESC)
- Installing plastic cover over clean areas to the south of the excavation
- Demolishing hardscape and direct loading for disposal/recycle
- Providing traffic control systems
- Utility protection
- Excavating clean and contaminated soils
- Stockpiling and draining/processing soil for disposal, as necessary
- Loading and hauling to disposal
- Sheet pile driving and removal
- Shaft drilling
- Waste water treatment
- Backfilling
- Equipment decontamination
- Site restoration, and demobilization

This Site Specific Health and Safety Plan (SSHASP) has been developed specifically for the activities required for this project. This SSHASP is intended to be used in conjunction with Clearcreek Contractors Accident Prevention Program (APP) and will be used as work-scope and hazard awareness training for Clearcreek Contractor personnel. Clearcreek Contractors places a premium on safety and acknowledges that a safe and healthy workplace is the responsibility of all personnel.

The SSHASP is intended to be a “living” document. It will be reevaluated in light of actual work progression and will be updated as needed. In addition, this plan will be made available to personnel involved with the site activities for this project. A copy will be located on the work site. It is the responsibility of the Clearcreek Contractors designated site supervisor to assure compliance with this SSHASP. Below is a list of personnel contacts for this site.

PERSONNEL CONTACTS

POSITION	NAME	CELL PHONE
Project Manager	Dan Hawk	206-354-9515
Safety Consultant	John Carlson	360-907-6665
Site Supervisor	Kurtis Jones	425-327-3614

A signature page for personnel authorized to work/visit on-site is provided at the end of this plan.

2. EMERGENCY PROCEDURES & SPILL RESPONSE

For life threatening injuries, fires or accidents immediately call 911. Clearcreek will provide first aid supplies to field-treat minor injuries. If an injured employee requires attention beyond normal first aid and the injury is not life threatening and does not require immediate assistance, the injured employee may be taken to the nearest occupational medical facility as provided in the **Appendix A** or as provided in the Clearcreek's electronic site management database.

A general list of safety and hygiene equipment to be kept on-site at all times is provided below:

- 10# A:B:C rated fire extinguishers
- Portable sanitation facility
- Decontamination boot wash and hand washing area
- First aid kits
- Eyewash bottles
- Gloves (Chemical resistant, leather)
- (2) spill kit drums
- SDS - for chemicals to be used or brought on-site (With HASP)

At the start of the project or as new personnel arrive on-site the locations of first aid/emergency equipment, telephone numbers, emergency communications, equipment emergency shutdown procedures, and evacuation routes will be reviewed with all personnel.

The potential spill sources include releases from heavy equipment during fueling, excavating operations, equipment maintenance operations and run-off from localized rain events. A spill containment/cleanup kit will be maintained on-site and will include containers, adsorbents, shovels and PPE. These containment materials will be used when working on equipment hydraulics undergoing repair / servicing, if necessary, and these spill containment materials will be capable of stopping a release from entering drainage conveyances or from moving off-site. If necessary the on-site excavation equipment can be used to contain the release in an earthen formed pit/dam.

For accidents and injuries, Clearcreek has developed the following protocol.

1. Stop all operations in case of accident or injury. Shut down heavy equipment.
2. Assess the situation. Render first aid and/or seek medical aid as necessary.
3. Immediately notify the Safety Manager
4. Notify Site designated personnel.

Underground utility lines (e.g., gas, electrical, water, and communications) may be present in the area. If these lines are identified or damaged:

1. Notify all personnel within the immediate area of the utility/strike, assess the situation, shut down all equipment, and stop work
2. Evacuate the area in the event of a gas leak and contact emergency responders
3. Notification of immediate supervisor and site personnel is required
4. The on-site designated supervisor will take the appropriate actions.

The following procedures should be followed in the unlikely event of a fire:

1 Notify all personnel within the immediate area of the fire
2. Evacuate the area in the event the fire cannot be extinguished safely
3. Go directly to the closest telephone and summon the nearest responders by calling 911
4. Notify the foreman site personnel immediately.

NOTICE – Clearcreek clients and client representative will be immediately advised of any spills, injuries / accidents that occur on the project site or in relation to the work operations.

The table below lists emergency contact information:

EMERGENCY CONTACTS

EMERGENCY	RESPONSE AGENCY	TELEPHONE NUMBER
Minor Injuries & Medical	**Regency Hot Line**	**1-800-267-6729**
Emergency	Fire/Police/Rescue/Ambulance	911
Poison Control	Washington State Poison Control Center	1-800-732-6985
Chemical Release	National Response Center	1-800-424-8802
Hospital	Highline Medical Center	206-244-9970

3. SITE CONTROL

The general site work areas may be surrounded by caution tape, temporary fence, barricading or other monitoring or security systems to prevent unauthorized entry to the site. Access will be limited to authorized personnel. Additional access will be permitted as necessary to complete the work and access control will be at the discretion of the site superintendent / foreman. Access to the construction site will be restricted to Clearcreek Contractors, Clearcreek Contractors' subcontractors, the Owner, the Owners Representatives, all concerned regulatory agencies, and visitors approved by the foreman. Access to the work area will be permitted only to those working directly on the project. Figure 1 attached identifies the areas of control.

Signage into the site:

Danger Construction Activity
100% PPE use in force
Check in with office before entry

Signage for contaminated soils:

Danger Contaminated Soils
Do Not Enter
Contact Miles Dyer at 971.717.4837
For Access

DANGER tape will be used to indicate area where permission is needed for entry and Yellow Caution tape will be used for areas where workers are to identify the nature of the hazard before entry.

4. CHEMICAL HAZARDS

The main chemical constituents to which personnel could be exposed include the following:

- Polychlorinated Biphenyls (PCB's) and TCE ((Trichloroethylene, trichloroethene, ethylene trichloride) see Table 1
- General equipment fuels, hydraulic and cooling fluids

Clearcreek Personnel and other Site personnel must be alert to any signs of environmental contamination (e.g., soil staining, odors, scrap metal, unexpected or unidentified drums or containers, treated lumber scraps, etc.).

Airborne hazards of primary concern are carbon monoxide, particulate matter, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), but may include an array of other constituents.

Inhalation: Dust and chemical vapors could be inhaled by personnel outside the exclusion zone. Water misting will be done for dust suppression and air monitoring will be performed for chemical vapor exposure.

Skin Contact: Personnel handling the stockpile or decontaminating equipment could have eye/skin contact if not wearing required PPE (gloves, safety glasses). Possible hazards from skin contact include irritation.

Ingestion: Ingestion could occur from personnel not wearing proper PPE and not washing hands prior to touching their face or eating food. Protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas and wearing proper PPE.

It is anticipated that the work likely to cause air-borne visible dust in the remedial work area is truck loading and truck hauling (e.g., soils stirred up from truck traffic). Stockpiles will be kept covered when not in use and on-site traffic speed will be limited to 5 mph to reduce dust generation. Clearcreek personnel will visually monitor dust emissions from these work methods/operations. Should visible dust emission be readily apparent, watering or misting will be performed to control dust. A water hose will be onsite should the need arise and a water truck will be available. If dust cannot be controlled, personnel exposure monitoring will be performed to document exposure to on-site and off-site persons. If there are any visible emissions upon startup of the remedial activities and in the best practice of protecting people and our clients interest, Clearcreek will perform air-borne "area" testing for VOC's during the startup of any new activity, air monitoring will be performed to verify that there is no exposure.

It is expected that there will be no air-borne exposure. Primary time monitoring will be performed is during drilling activity until drilling through the water table.

Clearcreek is required by **WAC 296-843** and **WAC 296-155** to use any and all exposure monitoring data when determining/assessing exposure hazards. Exposure monitoring will be part of assessing the hazards associated with the project.

5. PHYSICAL HAZARDS

Potential physical hazards associated with this project include heavy equipment operations, demolition activities, traffic control, excavations and trenching, lifting / hoisting, slips, trips and falls, long hours of work, weather extremes, temperature stress and noise.

- **Fire/Explosion**: Employees will only be allowed to smoke in designated areas. Designated areas will be located in the support areas only and not in the exclusion or contamination reduction zone. Fire extinguishers will be available for use in the work areas. All fire extinguishers will be certified annually and routinely checked for defects. Fueling of equipment will be done in areas that do not present a fire hazard. A funnel will be used to fuel as necessary to prevent spills. Any spills will be cleaned up immediately.

- **Noise Exposure**: Personnel will be provided with protection against the effects of hazardous noise exposure. Whenever sound-pressure levels exceed 85 dBA TWA, hearing protection will be worn. It is assumed that this sound pressure level is not exceeded if two people can engage in conversation using normal voices at a distance of 3 feet. If sound pressure levels exceed 115 dBA, hearing protection will be worn 100% of the time and warning signs will be posted alerting workers.

- **Slips, Trips, and Falls**: On-site personnel shall have high traction soles on safety toe boots to improve footing and to prevent slips, trips, and falls. Personnel should take care when walking in areas with open excavations or when stepping over materials. Good housekeeping can also prevent slips, trips and falls. Employees will immediately clean up all spills. All tools not in use should be picked up. During material handling activities a defined path should be cleared prior to moving all objects. Plastic sheeting used to line excavations or for stockpiling may become very slippery during rain or heavy moisture in air.

- **Overhead Hazards**: Operators must observe all overhead hazards, be especially cognizant of overhead power utilities in areas where equipment may pass under or be off-loaded. If equipment has the potential to hit buildings, tree limbs, etc., a spotter will be utilized to give warning and ensure proper clearance can be maintained. When overhead electrical power lines exist at or near a work site, consider all wires to be live and dangerous. Determine the minimum horizontal distance from any point on equipment to the nearest power line before the arm and bucket are raised. Equipment must be operated at the following distance from overhead lines (more in fog or rain which make visibility difficult):

Minimum Safe Distances from Power Lines

Voltage	Distance (feet)
120/240V	Determined by Utility Owner
50 kV or below	10
>50-200 kV	15
>200-350 kV	20
>350-500 kV	25
>500-750 kV	35
>750-1000 kV	45

- **Heavy Equipment**: Heavy equipment will be checked before use each day by the operator and, if more than routine maintenance is required, called in to the equipment maintenance line. Equipment operators must be knowledgeable about the safe operation of the equipment. Ground personnel will stay out of the immediate vicinity while heavy equipment is operating. All moving equipment will be equipped with back-up alarms. All personnel will wear high visibility safety apparel while equipment is operating on the site. Before approaching any equipment, site personnel will make eye contact with the operator and the operator shall acknowledge presence recognition. The bucket / blade needs be on the ground before approaching. Operators will utilize all seat belts and safety restraint devices. Haul routes will be established and discussed as part of the daily TAKE FIVE; implement routes which minimize truck crossings and trucks approaching embanked excavations.

- **Drilling equipment:** Equipment will be operated only by qualified personnel who are authorized by their respective employer to operate the equipment. The drilling equipment will be operated, inspected, and maintained as specified in the manufacturer's operating manual. A copy of the manual will be available at the job site.

  Members of drilling crews will be trained in:

  a. The operation, inspection, and maintenance of the equipment;
  b. The safety features and procedures to be used during operation, inspection, and maintenance of the equipment; and
  c. Overhead electrical line and underground hazards.

  Drilling equipment will be posted with signs warning the operator of electrical hazards. The equipment operator will assure proper clearance before moving equipment. Clearance will be monitored by a spotter or by an electrical proximity warning device. Danger tape will be around the drilling operation to protect workers from being caught in between and environmental hazards.

  Before drilling equipment is moved, the travel route will be visually surveyed for overhead and terrain hazards, particularly overhead electrical hazards.

  Equipment will be set-up on stable ground and maintained level. Cribbing will be used when necessary.

- **Crane & Hoist Safety**: Operators will have a license to operate cranes from an accredited NCCCO training facility.

Operators will comply with the following rules while operating the cranes and hoists:

1. Do not engage in any practice that will divert your attention while operating the crane.
2. Respond to signals only from the person who is directing the lift or any appointed signal person. Obey a stop signal at all times, no matter who gives it.
3. Do not move a load over people. People shall not be placed in jeopardy by being under a suspended load. Also, do not work under a suspended load unless the load is supported by blocks, jacks, or a solid footing that will safely support the entire weight. Have a crane or hoist operator remain at the controls or lock open and tag the main electrical disconnect switch.
4. Ensure that the rated load capacity of a crane's bridge, individual hoist, or any sling or fitting is not exceeded. Know the weight of the object being lifted or use a dynamometer or load cell to determine the weight.
5. Avoid side pulls. These can cause the hoist rope to slip out of the drum groove, damaging the rope or destabilizing the crane or hoist.
6. To prevent shock loading, avoid sudden stops or starts. Shock loading can occur when a suspended load is accelerated or decelerated, and can overload the crane or hoist. When completing an upward or downward motion, ease the load slowly to a stop.

At the start of each work shift, operators will perform a pre-operational checklist. This includes proper delineation around the crane.

Select rigging equipment that is in good condition. All rigging equipment will be inspected at the beginning of the job and documented. Defective equipment is to be removed from service and destroyed to prevent inadvertent reuse. The load capacity limits will be stamped or affixed to all rigging components.

- **Electrical Hazards**: On-site personnel may have a potential for electrical shock if there is improperly grounded equipment. To mitigate the hazards of electrical shock:

    - All electrical wiring and equipment will be of a type listed by a nationally recognized testing laboratory for the specific application for which it is to be used.
    - All work will be performed by personnel familiar with code requirements and qualified for the class of work.
    - Whenever possible, all equipment as well as circuits to be worked on will be de-energized before work is started and personnel protected by clearance procedures and grounding.
    - All circuits will be protected against overload.
    - A ground will be provided for non-current carrying metallic parts of equipment such as blowers, compressors, etc.

- **Material handling:** Employees will utilize proper lifting techniques including lifting with their legs instead of their backs. Also the buddy system must be used when lifting greater than 50 pounds or when carrying awkward items of any weight. When feasible, equipment will be used to move all items. All rigging will be inspected by a competent person. The operator will ensure that the equipment is rated to lift the load and that the rigging selected is appropriate for the lift.

- **Hand Injuries:** Employees will wear gloves when working with their hands and when there is the possibility of cuts, abrasions, pinches or chemical exposures. The type of glove to be worn is based on the hazard exposure. Always cut away from the body on a fixed / flat surface. Employees should use care when moving items and watch for pinch points.

- **Eye Injuries**: Safety glasses are required to be worn while working onsite. However, goggles and/or face shield may be required if work presents a splash, projection or flying debris hazard.

- **Trenching and Excavation**: All trenches and excavations will be inspected daily by the competent person or more often as needed. Personnel will not be allowed to enter any excavation or trench greater than 4 feet deep that is not benched, shored or sloped according to soil classification. Ladders or other means of safe egress will be provided within 25' of workers as required by WAC 296-155-650 for excavations greater than 4' in depth. All spoil piles and other heavy items will be maintained greater than 2 feet from the edge of an excavation. Air monitoring will be conducted prior to entering the excavation work zone when excavating non-saturated soil (soil above the water table) and during drilling activities, when there is the potential for chemical exposures (see Appendix D - Table 1) or depleted oxygen levels. Should hazardous atmospheric conditions be detected in or near a trench or excavation, entry to the excavation zone is not allowed until notifying the Clearcreek Safety Manager and implementing engineering controls to eliminate the hazardous condition. Trenches and excavations will be barricaded or covered during idle times to prevent unauthorized entry.

- **Underground Hazards**: Before beginning demolition, excavation or pavement breaking, underground and overhead hazards must be evaluated. Contact must be made with the owners of the utility lines or the nearest underground utility location service before excavating. Underground utilities must be located and physically flagged on-site as well as noted on the field report. Coordination with all utilities to shut off, cap or otherwise control all water, electric, gas and sewer lines to the location prior to excavating / demolition will be done prior to beginning work. If services must be maintained, lines will be relocated a safe distance from the demolition area or properly secured and shored. Hand digging or pot-holing is required within 2 feet of any underground utility that is being located. All utilities must be protected, supported or removed during excavation activities.

- **Confined Space Entry**: Only personnel that have been properly trained in confined space entry will be allowed to perform these activities at the site. Prior to entry, the atmosphere in the space must be tested with air monitoring equipment. Mechanical ventilation equipment will be used when atmosphere conditions are not satisfactory for entry. The confined space supervisor will approve all confined space entries and must remain at the confined space during the entry. Emergency communications must be maintained during confined space entry activities at the site. A Clearcreek self-issued "safe-for entry" permit must be completed and all employees must comply with all aspects of the confined space permit. Refer to **Clearcreek's electronic database** or Foreman's logbook for the confined space permit form.

- **Temperature Stress:** Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress.

  Heat stress can be a significant field site hazard, particularly for non-acclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat

stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress.

Employees will drink plenty of water in times of high heat and be provided a cool, shaded place to rest as needed. Every worker who works in extraordinary conditions that increase the risk of heat stress will be personally monitored. These conditions include wearing semi-permeable or impermeable clothing, working in times of high heat, or working at extreme metabolic loads. Employees may also be exposed to cold stress. Prevention of cold stress can include work/rest breaks and wearing appropriate clothing including impermeable clothing in wet weather. Refer to **Clearcreek's electronic database** for Clearcreek heat illness prevention policies.

- **Traffic:** Personnel and the public will be protected from traffic at the site by use of appropriate barricading and signage. Certified flaggers will be utilized when necessary to protect personnel and direct traffic around the work area. All trucks will follow the prescribed truck route provided by Clearcreek Contractors.

- **Hand and Power Tools**

    - Always use the right tools for the job.
    - Never remove or disengage tool safety features (e.g., guarding).
    - Make sure tools are sharpened, free of oil/grease and good working order before use.
    - Maintain tools and equipment as if they were your own.
    - Always use the appropriate PPE for the tool you are using.
    - If you find a defective tool or power cord, remove it from service, label it as defective and inform your supervisor; do not try to repair defective equipment.
    - Perform an inspection of tools and cords before use.
    - Do not raise/lower power tools by use of their electrical cord.
    - Power tools must be properly grounded before use.

6. BIOLOGICAL HAZARDS

Bees/Hornets Wasps will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened. Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, behind covers or lids and even on open ground.

Other protective measures are not normally effective against aggressive, flying insects. Be aware of the potential areas for these types of insects, approach these locations cautiously and if you locate insects back away without disturbing. Avoid reaching into areas where visibility is "limited". If stung by a wasp, bee, or hornet, notify a co-worker or someone who can assist, should you have an allergic reaction. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or sting, or any swelling or numbness beyond the site of the bite or sting.

Potential biological hazards include noxious flora and fauna, rodents, insects, and poisonous spiders. Precautions need to be taken to avoid direct contact with any animals, irritant plants or insects. If an insect bite / sting should occur the employee should rest for approximately 30 minutes and is to be

monitored using the buddy system to watch for allergic reactions. Keep all food scraps / garbage in sealed containers. Do not approach or harass wildlife likely to be found at the project site.

7. MONITORING

Exposure / Air Monitoring:

For contaminates listed in Appendix D - Table 1, primarily PCBs and TCE, direct read instruments will be used. See Table 1 for monitoring methods. The primary monitoring for PCB's will be visual. If dust is present, then exposure to PCB's is possible. See HASP prepared by Sound Earth Strategies for this project dated January 21, 2016, for details on monitoring requirements for TCE and other volatile contaminants in Table 1.

If the results of real-time air monitoring indicate sustained PID readings above 25 ppm (assuming vinyl chloride is not detected above 1 ppm as confirmed with colorimetric tubes, and PCBs are not detected above 1 ppm by monitoring with the Miniram), then additional engineering control options, such as ventilation and/or covering source areas, will be implemented.

Between phases of active construction, the minimum level of hazard control will consist of:

Level D Modified Personal Protective Equipment (PPE), which includes work boots, reflective safety vest, task-appropriate gloves, and task-appropriate safety glasses. Hearing protection as needed/applicable.

Level C PPE

If the results of real-time air monitoring with a Miniram and colorimetric tubes indicate that any of the following thresholds have been exceeded in the observer's breathing zone, then work will be temporarily suspended, and Clearcreek and the Responsible Parties will evaluate additional engineering controls for implementation:

- Airborne PCB concentrations greater than the Washington State Department Labor and Industries Safety & Health (DOSH) time-weighted average (TWA) of 0.5 mg/m^3
- Two consecutive airborne vinyl chloride concentrations greater than the DOSH time-weighted average (TWA) of 1.0 ppm
- Sustained PID readings that exceed the DOSH TWA of 50 ppm in the absence of PCBs and vinyl chloride exceedances.

If the real-time air-monitoring results indicate on-going exceedance of the above-listed thresholds, then the following Level C PPE will be required:

- Half-face air-purifying respirator with a stacked high-efficiency particulate air (HEPA) and organic vapor (OV) cartridge.
- Tyvek (or equivalent) in addition to Level D PPE.

A multi-gas meter will be used in addition to the other air monitoring when accessing deep excavations/ trenches or confined spaces; Clearcreek personnel will closely observe and record meter readings making sure atmospheric conditions stay within the following parameters:

- Oxygen not less than 19.5% or greater than 23.5%,
- CO not greater than 35 ppm,
- H_2S not greater than 10 ppm, and
- Lower explosive levels below 10% of the LEL.

Should any of the above values be measured outside / above the prescribed levels, work is to immediately be halted, the area evacuated and a complete hazard assessment performed.

8. PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment should be provided to prevent skin and eye contact as well as to control respiratory exposure. Skin protection can usually be achieved by wearing non-porous gloves, gauntlets, boots or shoe protection, and aprons or heavy overalls. For major spill clean-up operations, a full suite of non-porous clothing may be necessary. Unless the garment is heavily contaminated, non-porous protective clothing can usually be laundered and re-used. Work clothes should be laundered separately from other garments. Also, eye protection such as goggles and/or face shields should be provided and worn when there is a possibility that dust containing PCBs might enter the eyes. If soil containing PCBs should come into contact with a worker's eye(s), the eye(s) should be cleansed for at least 15 minutes. In addition, a drop of vegetable oil may be put into the eye(s) to relieve the irritating effect of PCBs. Also, involved workers should notify their doctor of their exposures. Modify Level D PPE is anticipated for this site.

Modify Level D Personal Protective Equipment will include the following:

- Safety toed boots (Boot protection-over boots)
- High visibility apparel/ Overalls
- Safety glasses or goggles or face shields
- Hard hat
- Gloves (Non-porous gloves)
- Ear plugs as needed

9. SANITATION & DECONTAMINATION PLAN

Personal Hygiene

All possible and necessary steps will be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials, etc.).

All personal decontamination activities will be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the Exclusion Zone (EZ).

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the support zone (SZ). Decontamination procedures may vary based on site conditions and nature of the contaminant(s). If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions.

The applicable Safety Data Sheet (SDS) must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated PPE and decontamination materials will be contained, stored and disposed of in accordance with site-specific requirements determined by site management.

DECONTAMINATION STANDARDS AND OBJECTIVES

JFC and Boeing require that equipment including shoring panels be decontaminated consistent with 40 CFR 761.79 (Decontamination standards and procedures for PCBs) as a prerequisite for re-use or removal from the site. Proper safety measures will be conducted during equipment decontamination as described herein. Two secure, designated work zones will be established; one on the JFC Property and one on the Boeing property for decontamination activities as shown on Figure 4 of the project work plan. The procedures to be followed are for the following decontamination activities:

- **Decontamination Standards**
- **Transportation and Staging of Equipment for Decontamination**
- **Designated Decontamination Work Zone**
- **Waste Minimization and Disposal**

Decontamination Standards

Excerpts cited below for regulatory standards are provided in Appendix C.

Non-disposable equipment and structures will be decontaminated using mechanical means or pressure washing to achieve a "clean debris surface" as defined in 40 C.F.R. §268.45, Table 1, footnote 3 and 40 C.F.R. §761.79 (h)(1). The facility already has demonstrated that the proposed method is capable of decontaminating the material to the applicable level set out in 40 C.F.R. §761.79 (b) (1) through (b) (4). JFC and Boeing will further ensure that any decontamination conducted pursuant to EPA's approval will be conducted in compliance with the requirements of 40 C.F.R. §761.79 (e) – (g).

The standard defined in §761.79(c) (2) (i) for moveable equipment (swabbing with solvent) will apply to any black stain areas. Black stained materials will be decontaminated within the range of 40°F and 100°F, for maximum extraction efficiency.

Reusable equipment will be decontaminated in accordance with the above-listed standards and objectives.

Decontamination process wastes will be disposed pursuant to 40 CFR §761.79 (g).

Transportation and Staging of Equipment for Decontamination

Equipment contacting potentially contaminated soils will be relocated to the loading /outgoing truck decontamination area to be decontaminated. In addition, some equipment such as excavator buckets may be decontaminated over the Subtitle C soil process area or over the Stage 2 CMP Removal area if excavation of this area is still in progress. Contaminated wash water over the latter two areas will be pumped to treatment along with other contaminated waters generated at these locations.

The transportation route will be kept uncontaminated by ensuring haul trucks are inspected and decontaminated at the point of loading. The truck decontamination area is lined with plastic sheeting to contain any residues that may become dislodged or drip during loading operations. Other equipment that may have become contaminated will be transported to a Decontamination Zone without contacting the ground surface by crane or moved along a prepared transportation route over protective plastic sheeting.

Transport will be scheduled on a fair-weather day so that precipitation does not require collection or management. The Decontamination Work Zones will be formally secured with temporary barricades and signage to communicate work zone access and egress conditions.

Transportation and Staging of Equipment for Decontamination

Large equipment will primarily be decontaminated over the truck load out/decontamination area. Contaminated soils will be contained within this cell and will be collected and loaded for transport to disposal at a Subtitle C facility at the completion of the work.

After soil processing is complete in the Subtitle C process area and contaminated soil removed, the upper liner of the double lined facility will be removed and replaced with a new, clean plastic liner. Extracted sheet piles will be moved to the double lined area for decontamination.

Sheet pile will be maintained above the protective liner on dunnage or ecology blocks. One side of the sheet piling will be cleaned and then the piling will be flipped over to clean the other side. After decontamination is complete for an individual sheet pile or sheet pile pair, the sheets will be removed from the decontamination zone and transported to the Jorgensen property for storage.

Designated Decontamination Work Zone

The Decontamination Work Zones (DWZs) are designated on the site as shown on Figure 4. The DWZs each constitute a plastic lined decontamination cell, will have a personnel Contamination Reduction Zone (CRZ), and an equipment staging area for before and after decontamination.

- Both decontamination zones will be constructed over plastic liners, to contain and collect decontamination fluids as well as precipitation that falls during decontamination activities.
- The waste water treatment system will remain operational throughout the decontamination period. Fluids will be transferred from the decontamination cell to the WWT facility for treatment and disposal.
- A portable CRZ will be established next to each decontamination zone. Workers will access and egress the decontamination cell through the CRZ, where they will be able to decontaminate and/or remove personal protective equipment (PPE) and other equipment.
- Solid and liquid wastes will be segregated and separately contained to the extent practicable.
- Liquid wastes anticipated from the planned scope of decontamination activities include: excess CAPSUR ® solvent, decontamination water if used inside the CRZ, and incidental precipitation that lands inside the decontamination cell.

Waste Minimization and Disposal

Steps will be taken to minimize the creation of waste to the extent practical and wastes will be disposed to the facilities to which the waste is profiled by JFC and Boeing.

10. SPILL PREVENTION CONTROL & COUNTERMEASURES (POLLUTION PREVENTION) – TEMPORARY EROSION & SEDIMENT CONTROL PLANNING

As part of our stewardship goals Clearcreek is responsible for protecting the environment and public health as part of the Department of Natural Resources project. Clearcreek recognizes the importance of protecting the environment and as such Best Management Practices in accordance with the Department of Natural Resources plans and specifications will be enforced.

In an emergency spill / erosion control situation, the site supervisor will serve as the competent person and will readily communicate with the appropriate clients/officials. The supervisor will require that work be stopped if any operation threatens the environment or public health / safety. Clearcreek Contractors will have a representative (Site Supervisor) and an alternate (Safety Manager) who will serve to respond to operational problems and/or emergencies on a 24-hour on-call basis.

Pollution prevention activities and hazard communications associated with managing and safekeeping these materials are as follows:

- Spills will be cleaned up immediately, properly reported and disposed
- Fuels used for small tools will be stored in approved “closed-top” safety cans
- Other chemicals such as marking paints will be stored in service truck compartments
- Fuels and fluids will be labeled according to manufacturer and LNI requirements
- Equipment requiring refueling will be performed at locations designated by the site supervisor
- Fueling operations will be conducted in locations away from storm conveyances or run-off areas
- Absorbents and diapers will be placed beneath equipment that requires servicing before servicing commences
- If required, subcontractors will be advised of the equipment fueling locations and equipment maintenance requirements
- To the extent practical contaminated soils will be direct loaded and immediately disposed to prevent contact with rain water or other surface materials
- Secondary containments may be established in areas where permanently affixed mechanical equipment is to be positioned (e.g., generator, pumping equipment, reservoir tanks, load-out areas, etc.)
- The excavation areas may be surrounded with sandbags or other means of diversion to prevent surface water runoff from entering the excavations
- Spill kits will be strategically placed at locations on site
- Immediately notify the emergency responders of any potential release to the environment or if discovering unknown materials, drums or tanks
- Site personnel will be trained in the methodologies needed to prevent spills and maintain as the project progresses

11. ILLUMINATION

Operations will be conducted during daylight hours. Lighting will be adequate for operations. If illumination systems are required, then appropriate quantity and placement of the lighting will be determined as per site conditions and activities.

12. HAZARD COMMUNICATION

As part of this project it will be important to communicate work efforts with all personal working at the site. This communication will be critical during the removal of the soil and the trucking operations. The information and training the employees receive must be tailored to the types of hazards and exposures they could encounter. The safety training program is designed for both new and experienced employees, and to provide training when a new chemical is brought into or is identified at the workplace. Prior to commencing work on this project, personnel will be advised and trained about the known/potential on-site contaminants and the precautions and decontamination procedures they are to follow.

Hazardous materials that may be encountered as existing on-site environmental or physical/health contaminants during the work activities are addressed in this HASP and their properties, hazards and associated required controls will be communicated to affected staff. In addition, there may be chemical hazards onsite that may be unknown. Upon identification, the nature of discovered chemical hazards will be communicated to project employees.

13. RESPONSIBILITY AND LINES OF AUTHORITY

Clearcreek Contractors has established an organizational structure for providing technical direction and administrative control to accomplish quality-related and safety goals on its' projects. The Health & Safety Manager (HSM) is responsible for the oversight and management of the HASP and provides technical oversight of Clearcreek Contractors environmental health and safety activities. The Project Manager and Superintendent will work with the HSM to accomplish project objectives in a safe and responsible manner. The designated foreman is responsible for the day to day on-site implementation and enforcement of the HASP. Along with other CCC personnel, the foreman will have the authority to stop work if unacceptable health or safety conditions exist and to take the necessary action to reestablish and maintain safe working conditions. The organizational structure promotes the attainment of these objectives by those who have been assigned responsibility for safety.

The site supervisor's roles and responsibilities include but are not limited to:

- Require the proper care and use of required personal protective equipment
- Inform and train employees on the hazardous chemicals and/or procedures they may encounter under normal working conditions or during an emergency situation.
- Conduct daily toolbox health and safety meetings at the start of each work shift to discuss health and safety issue and work plans for the workday and document attendance and meeting topics.
- Conduct walk-around safety inspections at the beginning of each job, and at least weekly thereafter.
- Train employees (new and experienced) in the safe and efficient methods of accomplishing each job or task as necessary
- Attend safety meetings and actively participate in the discussions and planning
- Participate in incident or near miss investigations and inspections
- Promote employee participation in the safety and health program

- Actively follow the progress of injured workers and display an interest in their rapid recovery and return to work. Make follow up phone calls to employees
- Promote a safe work environment every day

14. SITE COMMUNICATION PLAN

In order to handle emergencies effectively, planning is essential. Personnel must be ready to immediately rescue or respond; equipment must be on hand and in good working condition. This section describes the policies and procedures for responding to site emergencies.

In an emergency situation, the foreman will serve as the liaison with appropriate clients/officials. The foreman will recommend that work be stopped if any operation threatens worker or public health or safety. Clearcreek Contractors will have a representative (Site Foreman) and an alternate (Safety Manager) who will serve to respond to operational problems and/or emergencies on a 24-hour on-call basis.

The creation of an evacuation signal is necessary for safe operations. The use of an air horn or other signaling device (Flashing Lights) may be used in the event of an emergency to signal stop work and immediate evacuation to support zones. Workers should be cognizant of the reduction of communication abilities in high-noise areas.

Internal communication will be used to:

- Alert team members to emergencies.
- Pass along safety information.
- Communicate changes in the work to be accomplished.
- Maintain site control.

Verbal communication at the site can be impeded by background noise and the use of personal protective equipment. In an emergency, crucial messages must be conveyed quickly and accurately. For effective communication when wearing respirators, pre-arranged hand signals will be used. These hand signals will be interpreted as follows:

- Thumbs up - all clear / good to go
- Fist in the air or throat wave – stop work
- Grabbing wrist of personnel - evacuate
- Hands on throat - help and/or choking
- Head nod or wave – acknowledge presence

15. EMERGENCY/CONTINGENCY PLANS

No one will attempt emergency response or rescue until backup personnel and evacuation routes have been identified. Rescue/response actions may include:

- Enforce the buddy system: Allow no one to enter the work zone or hazardous area during an emergency without a partner. At all times, personnel in the work zone will be in the line-of-sight or communication contact with a designated person. **NOTICE** – if site work operations warrant or allow a single employee to be working on-site, for example, driver and operator, a cell-phone communication plan will be established with the home office.
- Survey Injuries (if applicable):

Locate victims and assess their condition.
Determine resources needed for stabilization and transport.

- Assess existing and potential hazards to site personnel and to the off-site population. Determine:
  - Whether and how to respond.
  - The need for evacuation of site personnel and off-site population.
  - The resources needed for evacuation and response.
- Allocate resources. Allocate on-site personnel and equipment to rescue and initiate response operations.
- Request first aid. Contact the required off-site personnel or facilities.
- Control. Bring the hazardous situation under complete or temporary control; use measures to prevent the spread of the emergency.
- Extricate. Remove or assist victims from the area.
- Decontaminate. Use established procedures to decontaminate uninjured personnel in the Contaminant Reduction Zone. If the emergency makes this area unsafe, establish a new decontamination area at an appropriate distance. Decontaminate victims before or after stabilization as their medical condition indicates.
- Stabilize. Administer any medical procedures that are necessary before the victims can be moved. Stabilize or permanently fix the hazardous condition. Attend to what caused the emergency and anything damaged or endangered by the emergency.
- Transport. Take measures to minimize chemical contamination of the transport vehicle and ambulance and hospital personnel. See Appendix A for treatment center locations. Adequately protected rescuers should decontaminate the victims before transport.
- Evacuate:

  ⇒ Move site personnel to a safe distance upwind of the incident unless the emergency or physical obstructions preclude evacuation in such direction. This measure may require personnel to abandon normal decontamination procedures.

  ⇒ Monitor the incident for significant changes. The hazards may diminish, permitting personnel to reenter the site, or increase and require public evacuation.

  ⇒ Inform public safety personnel when there is a potential or actual need to evacuate the off-site population.

16. STANDING OPERATING PROCEDURE

- Eating, drinking or smoking are not allowed in the work areas, but can occur during designated breaks.
- Smoking will be prohibited in all active work areas. Smoking can occur during designated breaks in designated areas only.
- Materials handling
  - Personnel will be trained in proper lifting and moving techniques
  - Use caution and appropriate rigging and tag lines when handling and moving equipment. All equipment and rigging material must be rated for the load that it is to move.
- Storage
  - Separate storage areas will be created for the various waste streams associated with the work
  - Signs and labels will be used to clearly mark containerized waste material, supplies, etc.
- Transport
  - Materials will be evenly distributed in transport vehicle.
  - Trucks may need to be tarped prior to transporting regulated materials

- Engineering Controls may include water suppression, noise barriers, and shielding.
- Safety inspections: Safety inspections will be conducted to identify safety and health issues and deficiencies, and the actions, timetable, and responsibility for correcting the deficiencies. Follow-up inspections to ensure correction of any identified deficiencies will be conducted in a like manner. To ensure a safe work environment, the following general precautions will help preclude injuries and/or accidents due to working with tools and heavy equipment:
    - Make sure equipment has appropriate guards and engineering controls. These may include rollover protective structures, seat belts, emergency shutoff in case of rollover, and backup warning lights and signals.
    - Be certain that equipment and tools are intrinsically safe or use three-wire grounded extension cords to prevent electric shock.
    - At the start of each day, inspect brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, and splash protection.
    - Tools and equipment are to be maintained in accordance with the manufacturer's guidance.
    - Keep all non-essential people out of the work area.
    - Prohibit loose-fitting clothing or loose, long hair around moving machinery.
    - Keep cabs free of all non-essential items and secure all loose items.
    - Do not exceed the rated load capacity of a vehicle / equipment / rigging.
    - Instruct equipment operators to report to their supervisor(s) or the PM of any abnormalities such as equipment failure, oozing liquid, unusual odors, etc.
    - All blades and buckets should be lowered to the ground and parking brakes set before shutting off vehicles.
    - Inspect all tools and moving equipment to ensure that parts are secured and intact with no evidence of cracks or areas of weakness, that the equipment turns smoothly with no evidence of wobble, and that it is operating according to manufacturer's specifications.
    - Store tools in clean, secure areas so that they will not be damaged, lost, or stolen.
    - Perform safety inspections on a daily basis and complete the Clearcreek TAKE FIVE Inspection Form.
    - Other safety tasks as deemed appropriate by the designated safety representative.

17. TRAINING / MEETINGS

Clearcreek personnel engaged in activities that involve excavating, handling and transporting potentially contaminated soils shall be 40 hour trained, with current 8 hour refresher. Medical examinations required by the HAZWOPER standard must include a medical and work history with special emphasis on symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty (including the ability to wear required PPE under conditions that may be expected at the worksite). [29 CFR 1910.120(f)(4)(i)]. However, the HAZWOPER standard does not otherwise dictate the content of any required medical examinations or consultations. The determination of what to include in an exam or consultation (e.g., blood pressure, blood testing, pulmonary function, etc.) is left to the discretion of the attending physician. [29 CFR 1910.120(f)(4)(ii)]. Moreover, the HAZWOPER standard does not set any specific exclusionary criteria. The physician should base his or her medical examination, and monitoring and exclusion criteria, if any, on the worker's exposures (or likely exposures), as well as the worker's duties and responsibilities. A pre-work safety conference will be held prior to commencement of field activities and attended by field personnel that may work on the project. This meeting will be conducted by the foreman / manager to ensure that personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment; this meeting should be conducted congruently with the client and subcontractors.

A daily tailgate health and safety meeting will be held and documented. These meetings will include a discussion about the anticipated hazards, controls, recent accidents or near misses and other safety and health information. A briefing will be provided when changes in work practices must be implemented due to new information made available or if site environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices when conformances with these practices are not being followed or if deficiencies are identified during safety inspections. . The Clearcreek daily safety meeting SAFETY MOMENT (topic) is provided in the **Dropbox file folder** and the Clearcreek Safety Toolbox.

Task-specific Job Safety Analysis (JSA) have been prepared for the major work operations and high-hazard work activities for this project. Prior to commencing work on-site the job site Superintendent/foreman will discuss and cover the contents of these JSA's with Clearcreek personnel. The JSA documentation / forms for this project are provided in the **Dropbox File Folder.** Safety training certificates for Clearcreek personnel are provided in the **Dropbox File Folder.**

18. REPORTING

Despite best efforts to eliminate hazards and prevent accidents, employees may be injured in the performance of their work. Every accident includes a sequence of contributing events or actions which leads to the accident. Each employee is obligated to report to his/her supervisor any work-related injury or illness, or accidental damage to property immediately. Personnel and supervisors will fill out the accident investigation form and submit it to the Clearcreek Safety Manager. Accidents will be reported and investigated in accordance with the Clearcreek Accident Prevention Program (APP).

SITE SPECIFIC HEALTH & SAFETY PLAN ACKNOWLEDGMENT SHEET

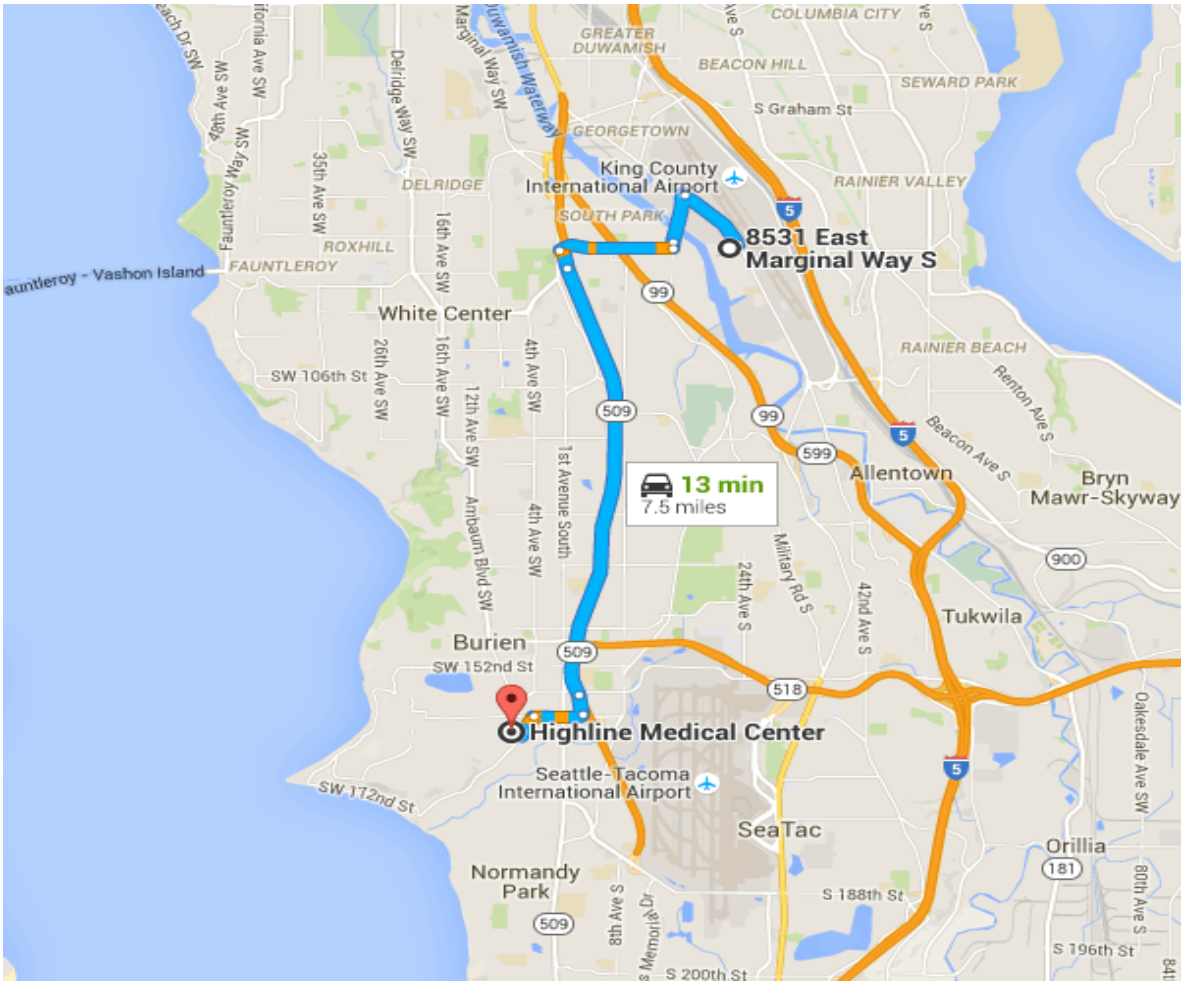
I acknowledge having received a briefing on this Site Specific Health and Safety Plan (HASP), and that I understand the requirements of this plan, I further acknowledge that failure to follow the requirements of this plan may result in removal from this site.

Printed Name	*Company*	*Signature*	*Date*

Appendix A

Directions to Hospital

Highline Medical Center
16251 Sylvester Road Southwest
Burien, WA 98166
Phone: 206-244-9970
Emergency Room: 206-431-5316



1.	Head northwest on E Marginal Way S	0.7 mi
2.	Turn left onto 16th Ave S	0.5 mi
3.	Continue onto 14th Ave S	338 Ft
4.	Turn right onto S Cloverdale St	0.9 mi
5.	Turn left to merge onto WA-509 S	0.2 mi
6.	Merge onto WA-509 S	4.3 mi
7.	Take the exit toward S. 160th St	0.2 mi
8.	Turn right onto S 160th St	0.4 mi
9.	Turn left onto Sylvester Rd SW,	0.2 mi
	Destination will be on your right	Total drive 7.5 mi, 13 min

Appendix B

Job Safety Analysis

(JSAs)

(To Be Amended As Project Progresses)

Appendix C

Decontamination Regulation References

40 C.F.R. §268.45, Table 1, footnote 3 reads:

"Clean debris surface" means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

40 C.F.R. §761.79 (h)(1) reads:

(h) Alternative decontamination or sampling approval.

(1) Any person wishing to decontaminate material described in paragraph (a) of this section in a manner other than prescribed in paragraph (b) of this section must apply in writing to the Regional Administrator in the Region where the activity would take place, for decontamination activity occurring in a single EPA Region; or to the Director, Office of Resource Conservation and Recovery, for decontamination activity occurring in more than one EPA Region. Each application must describe the material to be decontaminated and the proposed decontamination method, and must demonstrate that the proposed method is capable of decontaminating the material to the applicable level set out in paragraphs (b)(1) through (b)(4) of this section.

40 C.F.R. §761.79 (b) reads:

(b) Decontamination standards. Chopping (including wire chopping), distilling, filtering, oil/water separation, spraying, soaking, wiping, stripping of insulation, scraping, scarification or the use of abrasives or solvents may be used to remove or separate PCBs, to the following standards, from liquids, concrete, or non-porous surfaces.

(1) The decontamination standard for water containing PCBs is:

(i) Less than 200 µg/L (i.e., <200 ppb PCBs) for non-contact use in a closed system where there are no releases;

(ii) For water discharged to a treatment works (as defined in §503.9(aa) of this chapter) or to navigable waters, <3 µg/L (approximately <3 ppb) or a PCB discharge limit included in a permit issued under section 307(b) or 402 of the Clean Water Act; or

(iii) Less than or equal to 0.5 µg/L (i.e., approximately ≤0.5 ppb PCBs) for unrestricted use.

(2) The decontamination standard for organic liquids and non-aqueous inorganic liquids containing PCBs is <2 milligrams per kilogram (i.e., <2 ppm PCBs).

(3) The decontamination standard for non-porous surfaces in contact with liquid and non-liquid PCBs is:

(i) For unrestricted use:

(A) For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, ≤10 micrograms PCBs per 100 square centimeters (≤10 µg/100 cm2) as measured by a standard wipe test (§761.123) at locations selected in accordance with subpart P of this part.

(B) For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal), cleaning to Visual Standard No. 2, Near-White Blast Cleaned Surface Finish, of the National Association of Corrosion Engineers (NACE). A person shall verify compliance with standard No. 2 by visually inspecting all cleaned areas.

(ii) For disposal in a smelter operating in accordance with §761.72(b):

(A) For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, <100 µg/100 cm2 as measured by a standard wipe test (§761.123) at locations selected in accordance with subpart P of this part.

(B) For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal), cleaning to Visual Standard No. 3, Commercial Blast Cleaned Surface Finish, of the National Association of Corrosion Engineers (NACE). A person shall verify compliance with standard No. 3 by visually inspecting all cleaned areas.

(4) The decontamination standard for concrete is ≤10 µg/100 cm2 as measured by a standard wipe test (§761.123) if the decontamination procedure is commenced within 72 hours of the initial spill of PCBs to the concrete or portion thereof being decontaminated.

40 C.F.R. §761.79 (e) – (g) reads:

(e) Limitation of exposure and control of releases.

(1) Any person conducting decontamination activities under this section shall take necessary measures to protect against direct release of PCBs to the environment from the decontamination area.

(2) Persons participating in decontamination activities shall wear or use protective clothing or equipment to protect against dermal contact or inhalation of PCBs or materials containing PCBs.

(f) Sampling and recordkeeping.

(1) Confirmatory sampling is required under paragraph (b) of this section. For liquids described in paragraphs (b)(1) and (b)(2) of this section, sample in accordance with §§761.269 and 761.272. For non-porous surfaces and concrete described in paragraphs (b)(3) and (b)(4) of this section, sample in accordance with subpart P of this part. A written record of such sampling must be established and maintained for 3 years from the date of any decontamination under this section. The record must show sampling locations and analytical results and must be retained at the site of the decontamination or a copy of the record must be made available to EPA in a timely manner, if requested. In addition, recordkeeping is required in accordance with §761.180(a) for all wastes generated by a decontamination process and regulated for disposal under this subpart.

(2) Confirmatory sampling is not required for self-implementing decontamination procedures under paragraph (c) of this section. Any person using these procedures must retain a written record documenting compliance with the procedures for 3 years after completion of the decontamination procedures (e.g., video recordings, photographs).

(g) Decontamination waste and residues. Decontamination waste and residues shall be disposed of at their existing PCB concentration unless otherwise specified.

(1) Distillation bottoms or residues and filter media are regulated for disposal as PCB remediation waste.

(2) PCBs physically separated from regulated waste during decontamination (such as by chopping, shredding, scraping, abrading or oil/water separation, as opposed to solvent rinsing and soaking), other than wastes described in paragraph (g)(1) of this section, are regulated for disposal at their original concentration.

(3) Hydrocarbon solvent used or reused for decontamination under this section that contains <50 ppm PCB must be burned and marketed in accordance with the requirements for used oil in §761.20(e), disposed of in accordance with §761.60(a) or (e), or decontaminated pursuant to this section.

(4) Chlorinated solvent at any PCB concentration used for decontamination under this section shall be disposed of in an incinerator operating in compliance with §761.70, or decontaminated pursuant to this section.

(5) Solvents ≥50 ppm other than those described in paragraphs (g)(3) and (g)(4) of this section shall be disposed of in accordance with §761.60(a) or decontaminated pursuant to this section.

(6) Non-liquid cleaning materials and personal protective equipment waste at any concentration, including non-porous surfaces and other non-liquid materials such as rags, gloves, booties, other disposable personal protective equipment, and similar materials resulting from decontamination shall be disposed of in accordance with §761.61(a)(5)(v).

40 C.F.R. §761.79(c) (2) (i) reads:

(c) Self-implementing decontamination procedures. The following self-implementing decontamination procedures are available as an alternative to the measurement-based decontamination methods specified in paragraph (b) of this section. Any person performing self-implementing decontamination must comply with one of the following procedures.

(2) Any person decontaminating movable equipment contaminated by PCBs, tools, and sampling equipment may do so by:

(i) Swabbing surfaces that have contacted PCBs with a solvent;

40 CFR §761.79 (g) reads:

(g) Decontamination waste and residues. Decontamination waste and residues shall be disposed of at their existing PCB concentration unless otherwise specified.

(1) Distillation bottoms or residues and filter media are regulated for disposal as PCB remediation waste.

(2) PCBs physically separated from regulated waste during decontamination (such as by chopping, shredding, scraping, abrading or oil/water separation, as opposed to solvent rinsing and soaking),

other than wastes described in paragraph (g)(1) of this section, are regulated for disposal at their original concentration.

(3) Hydrocarbon solvent used or reused for decontamination under this section that contains <50 ppm PCB must be burned and marketed in accordance with the requirements for used oil in §761.20(e), disposed of in accordance with §761.60(a) or (e), or decontaminated pursuant to this section.

(4) Chlorinated solvent at any PCB concentration used for decontamination under this section shall be disposed of in an incinerator operating in compliance with §761.70, or decontaminated pursuant to this section.

(5) Solvents ≥50 ppm other than those described in paragraphs (g)(3) and (g)(4) of this section shall be disposed of in accordance with §761.60(a) or decontaminated pursuant to this section.

(6) Non-liquid cleaning materials and personal protective equipment waste at any concentration, including non-porous surfaces and other non-liquid materials such as rags, gloves, booties, other disposable personal protective equipment, and similar materials resulting from decontamination shall be disposed of in accordance with §761.61(a)(5)(v).

Appendix D

Table 1 – Chemical Hazards

TABLE 1 CHEMICAL HAZARDS

Chemical (or Class)	DOSH PEL/AL (OSHA PEL if different)	Other Pertinent Limits	Routes of Exposure / Warning Properties	Exposure Symptoms	Target Organs	Recommended PPE / Respiratory Protection	Recommended Monitoring/ Sampling Method
Polychlorinated Biphenyls – Aroclor 1254 (PCBs, Chlorodiphenyl 54% Chlorine)	DOSH PEL: 0.5 mg/m^3 TWA 1.5 mg/m^3 STEL	NIOSH REL: 0.001 mg/m^3 TWA IDLH: 5 mg/m^3 Carcinogen Exposure to fire creates polychlorinated dibenzo-p-dioxins and -furans	Inhalation, ingestion, skin absorption, eye contact Mild hydrocarbon odor	Irritation of eyes, chloracne, liver damage, reproductive effects (potential occupational carcinogen)	Eyes, skin, liver, reproductive system Eye: Irrigate immediately Skin: Soap flush immediately Inhalation: Respiratory support Ingestion: Medical attention immediately	▪ Impermeable, chemical resistant disposable clothing ▪ Nitrile or neoprene gloves If PEL is exceeded: FAPR with stacked HEPA and OV cartridge	If potential for exposure exists: ▪ Monitor for PCBs ▪ Real-Time Monitoring ▪ Miniram or equivalent **If breathing zone measurement exceeds 0.5 mg/m^3 PCBs:** ▪ Temporarily suspend work to evaluate and implement engineering controls ▪ Continue real-time monitoring ▪ Upgrade to FAPR if exceedances continue
1,2-Dichloroethylene	OSHA PEL: 200 ppm TWA	NIOSH REL: 200 mg/m^3 TWA IDLH: 1,000 mg/m^3	Inhalation, ingestion, skin contact Acrid, chloroform-like odor	Irritation of eyes, chloracne, respiratory system, central nervous system	Eyes, skin, respiratory system, central nervous system Eye: Irrigate immediately Skin: Soap flush immediately Inhalation: Respiratory support Ingestion: Medical attention immediately	▪ Impermeable, chemical resistant disposable clothing ▪ Nitrile gloves ▪ Monitor for TCE and Vinyl Chloride	If potential for exposure exists: ▪ Monitor for TCE and Vinyl Chloride

Chemical (or Class)	DOSH PEL/AL (OSHA PEL if different)	Other Pertinent Limits	Routes of Exposure Warning Properties	Exposure Symptoms	Target Organs	Recommended PPE Respiratory Protection	Recommended Monitoring/ Sampling Method
DRPH (Petroleum distillates)	DOSH PEL: 100 ppm TWA 150 ppm STEL OSHA PEL: 500 ppm TWA	NIOSH REL: 86 ppm TWA 444 ppm STEL ACGIH TLV: 100 mg/m^3 TWA IDLH: 1,100 ppm FP: -40 to -86˚F LEL: 1.1% Carcinogen Combustible liquid	Inhalation, ingestion, skin or eye contact Gasoline or kerosene-like odor Floats on water Clear, yellow-brown liquid	Irritation of eyes, nose, throat; dizziness; drowsiness; headache; nausea; dry cracked skin; inflammation of lungs; dermatitis; skin reddening	Eyes, skin, respiratory system, central nervous system, kidneys Breathing: Respiratory support	▪ Impermeable, chemical-resistant, disposable clothing ▪ Nitrile or neoprene gloves If PEL of 100 ppm is exceeded: APR equipped with OV cartridge	If potential for exposure exists: ▪ Real-Time Monitoring ▪ 10.2 or 10.6 eV PID **Refer to TCE for Response Action**
TCE (Trichloroethylene, trichloroethene, ethylene trichloride)	DOSH PEL: 50 ppm TWA 200 ppm STEL OSHA PEL: 100 ppm TWA 200 ppm C 300 ppm peak (5 minutes)	IDLH: 1,000 ppm LEL: 8% None	Inhalation, skin absorption, ingestion, skin or eye contact Chloroform-like odor	Irritation of eyes and skin; headache; visual disturbance; weakness; exhaustion; dizziness; tremor; drowsiness; nausea; vomiting; tingling, pricking, and inflammation of skin; cardiac arrhythmias; liver injury (potential occupational carcinogen)	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support **Swallow: Medical attention immediately**	Impermeable, chemical resistant disposable clothing Nitrile gloves If PEL of 50 ppm is exceeded: FAPR with stacked HEPA and OV cartridge	**If potential for exposure exists:** ▪ Real-Time Monitoring ▪ 10.2 or 10.6 eV PID **If breathing zone measurement reaches 50 ppm in the absence of vinyl chloride:** ▪ Temporarily suspend work to evaluate and implement engineering controls ▪ Continue real-time monitoring ▪ Upgrade to FAPR if exceedances continue

Chemical (or Class)	DOSH PEL/AL (OSHA PEL if different)	Other Pertinent Limits	Routes of Exposure / Warning Properties	Exposure Symptoms	Target Organs	Recommended PPE / Respiratory Protection	Recommended Monitoring/ Sampling Method
Vinyl Chloride (Chloroethylene)	DOSH PEL: 1 ppm TWA 5 ppm STEL OSHA PEL: 1 ppm TWA	LEL: 3.6% Carcinogen Attacks iron and steel in the presence of moisture Polymerizes in air and sunlight Flammable gas at standard temperature and pressure	Inhalation, ingestion, skin or eye contact Pleasant odor at high concentrations	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Liver, central nervous system, blood, respiratory system, lymphatic system Eyes and skin: If frostbite has occurred, seek medical attention immediately; if tissue is not frozen, immediately flush with water for a minimum of 15 minutes. Breathing: Respiratory support	▪ Impermeable, chemical resistant disposable clothing Silver Shield/composite gloves If PEL of 1 ppm is exceeded: FAPR with stacked HEPA and OV cartridge	**If potential for exposure exists:** ▪ Real-Time Monitoring ▪ Draeger Tubes (or equivalent) ▪ 0.5 to 30 ppm **If breathing zone measurement exceeds 1 ppm vinyl chloride:** ▪ Temporarily suspend work to evaluate and implement engineering controls ▪ Continue real-time monitoring ▪ Upgrade to FAPR if exceedances continue

ATTACHMENT 2

REQUIRED PROCEDURES FOR DECONTAMINATION

Excerpts from:

JORGENSEN FORGE OUTFALL SITE, FINAL SSP DECONTAMINATION WORK PLAN, STANDARDS AND OBJECTIVES (Sound Earth Strategies, September 2, 2015)

REQUIRED PROCEDURES FOR DECONTAMINATION

The following procedures are required for decontamination of equipment, personnel and materials used in connection with Jorgensen Forge Outfall Site (JFOS) removal actions under CERCLA Docket No. 10-2011- 0017. The required procedures include waste minimization and containment objectives, and documentation of compliance with 40 CFR 761.79 (Decontamination standards and procedures for PCBs). The procedures to be followed are for the following decontamination activities:

- Decontamination Standards
- Transportation and Staging of SSP Panels
- Designated Decontamination Work Zone
- Waste Minimization
- Waste Management and Disposal

Decontamination Standards

For standards referenced, see Decontamination Regulation References attached

- Non-disposable equipment and structures must be decontaminated using mechanical means or pressure washing to achieve a "clean debris surface" as defined in 40 C.F.R. §268.45, Table 1, footnote 3 and 40 C.F.R. §761.79 (h)(1). On previous projects at the Jorgensen Forge facility, it has been demonstrated that the methods proposed herein are capable of decontaminating the material to the applicable level set out in 40 C.F.R. §761.79 (b)(1) through (b)(4). Any decontamination conducted pursuant to EPA's approval will be conducted in compliance with the requirements of 40 C.F.R. §761.79 (e) – (g).
- The standard defined in §761.79(c)(2)(i) for moveable equipment (swabbing with solvent) will apply to the black stain areas near the former top ends of the SSP panels. Prior to treating the black stain, the surface temperature of each SSP panel will be measured using an infrared thermometer to confirm that the materials are within the range of 40°F and 100°F, for maximum extraction efficiency.
- Reusable equipment will be decontaminated in accordance with the above-listed standards and objectives.
- Decontamination process wastes will be disposed to appropriate permitted landfill facilities pursuant to 40 CFR §761.79 (g).

Transportation and Staging of SSP Panels

SSP panels that are extracted following clean backfill placement in the Stage 2 CMP Removal area will be relocated to the proposed staging area inside the designated Decontamination Work Zone (converted Subtitle C soil process area).

- The ground surface of the transportation route of potentially contaminated equipment will be covered with minimum 6-mil scrim reinforced plastic sheeting to intercept any residues that may become dislodged during rigging and transport.
- The SSP panels will be transported by crane to the Decontamination Work Zone above the protected transportation route, without contacting the ground surface or protective plastic sheeting.

- The SSP panels will be stacked on dunnage and under plastic sheeting. Transport will be scheduled on a fair-weather day so that precipitation contacting the potentially contaminate equipment does not require collection or management.
- The Decontamination Work Zone will be formally secured with temporary fencing and signage described in the Work Plan and SSHASP to communicate work zone access and egress conditions.

Designated Decontamination Work Zone

A Decontamination Work Zone will be designated on Boeing's Property inside the secured site area within 200 feet of the Stage 2 CMP Removal area where the SSP panels will have been installed. The Decontamination Work Zone will encompass a decontamination cell (converted Subtitle C soil process and storage area), a contaminated SSP panel staging area within the decontamination cell, a clean SSP panel storage area outside the decontamination cell and a Contamination Reduction Zone (CRZ),

- The Decontamination Work Zone and paved portions of the access route from the temporary staging area shall be street-swept prior to designating and securing the work zone, and the approximate corners of the work zone will be marked with utility locating paint on pavement prior to transporting the SSP panels.
- The decontamination cell will consist of a bermed perimeter lined with two sheets of heavy-duty geomembrane with a minimum thickness of 20 mils, separated by a 6-inch thick layer of sand. The berm will be constructed using Ecology blocks, or equivalent weighted barriers, and the liner draped over the Ecology blocks as shown on Figure 6. The decontamination cell will be about 30' wide by 85' long, which is longer than the maximum length SSP panels (60 feet long).
- The on-site water treatment system will be maintained on-site for storage and treatment of decontamination fluids and any incidental precipitation that lands inside the decontamination cell. Fluids will be transferred from the cell to the treatment system using a sump pump, so that fluid levels inside the decontamination cell do not exceed 6 inches deep at the sump.
- A CRZ will be established next to the decontamination cell. Workers will access and egress the decontamination cell through the CRZ, where they will be able to decontaminate and/or remove personal protective equipment (PPE) and other equipment.
- Solid and liquid wastes will be segregated and separately contained to the extent practicable:
    - Solid wastes anticipated from the planned scope of decontamination activities include: solid residue vacuumed from the former bottom ends of the SSP panels; dunnage; PPE; slings, rigging, and guide ropes that contact the SSP panels; plastic sheeting; wire brushes and scraping tools.
    - Liquid wastes anticipated from the planned scope of decontamination activities include: excess CAPSUR ® solvent used to wipe stained areas and treat the interlock channels, decontamination water used inside the CRZ, and incidental precipitation that lands inside the decontamination cell.
- Separate staging areas will be established for stacking and protecting the SSP panels before and after decontamination. The staging area will be used to stack SSP panels on dunnage, on and under plastic sheeting, and wattles to control precipitation runoff.

Waste Minimization

In an effort to minimize waste volumes, decontamination of the SSP panels will proceed according to the following sequence:

1. Dunnage will be placed at intervals that do not come into contact with any black stain or other unidentified discoloration and the sandy residue that is known to form on the bottom ends of the SPP panels.
2. Dunnage will be visually inspected and brushed as necessary whenever the SSP panels are flipped to ensure that any dislodged particles do not come into contact with a decontaminated side of an SSP panel.
3. The sandy residue will be scraped and vacuumed from the former bottom ends of the SSP (both sides).
4. Any black stains or other unidentified discoloration will be swabbed using CAPSUR® solvent.
5. Excess solvent will be allowed to flow through the interlock channel down to the former bottom ends, where it will be collected and contained for disposal.
6. In the event that black staining is present after treating with CAPSUR®, an alternative solvent product will be applied to remove the stain residue.
7. Any sandy residue remaining after the first step will be scraped and vacuumed a second time.
8. If the previous methods are ineffective, targeted air pressure applied to the interlock channel may be used to remove sandy residue from the former bottom ends of the channel. If air pressure becomes necessary, a portable framed enclosure finished with plastic sheeting will be constructed around the former bottom ends of the SSP panels to intercept and contain any residual particles released from the channels. Dislodged particles will be vacuumed from around and under the targeted area. The enclosure will be portable so that it does not interfere with safe rigging, flipping, or transport of the SSP panels.

Waste Management and Disposal

The management and coordinate of the segregation, containment, profiling, and disposal of solid and liquid wastes will be in accordance with the attached work plan and applicable state, local and federal regulations.

Decontamination Regulation References

- **40 C.F.R. §268.45, Table 1, footnote 3 reads:**

"Clean debris surface" means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

- **40 C.F.R. §761.79 (h)(1) reads:**

(h) Alternative decontamination or sampling approval.

(1) Any person wishing to decontaminate material described in paragraph (a) of this section in a manner other than prescribed in paragraph (b) of this section must apply in writing to the Regional Administrator in the Region where the activity would take place, for decontamination activity occurring in a single EPA Region; or to the Director, Office of Resource Conservation and Recovery, for decontamination activity occurring in more than one EPA Region. Each application must describe the material to be decontaminated and the proposed decontamination method, and must demonstrate that the proposed method is capable of decontaminating the material to the applicable level set out in paragraphs (b)(1) through (b)(4) of this section.

- **40 C.F.R. §761.79 (b) reads:**

(b) Decontamination standards. Chopping (including wire chopping), distilling, filtering, oil/water separation, spraying, soaking, wiping, stripping of insulation, scraping, scarification or the use of abrasives or solvents may be used to remove or separate PCBs, to the following standards, from liquids, concrete, or non-porous surfaces.

(1) The decontamination standard for water containing PCBs is:

(i) Less than 200 µg/L (i.e., <200 ppb PCBs) for non-contact use in a closed system where there are no releases;

(ii) For water discharged to a treatment works (as defined in §503.9(aa) of this chapter) or to navigable waters, <3 µg/L (approximately <3 ppb) or a PCB discharge limit included in a permit issued under section 307(b) or 402 of the Clean Water Act; or

(iii) Less than or equal to 0.5 µg/L (i.e., approximately ≤0.5 ppb PCBs) for unrestricted use.

(2) The decontamination standard for organic liquids and non-aqueous inorganic liquids containing PCBs is <2 milligrams per kilogram (i.e., <2 ppm PCBs).

(3) The decontamination standard for non-porous surfaces in contact with liquid and non-liquid PCBs is:

(i) For unrestricted use:

(A) For non-porous surfaces previously in contact with liquid PCBs at any

concentration, where no free-flowing liquids are currently present, ≤10 micrograms PCBs per 100 square centimeters (≤10 µg/100 cm2) as measured by a standard wipe test (§761.123) at locations selected in accordance with subpart P of this part.

(B) For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal), cleaning to Visual Standard No. 2, Near-White Blast Cleaned Surface Finish, of the National Association of Corrosion Engineers (NACE). A person shall verify compliance with standard No. 2 by visually inspecting all cleaned areas.

(ii) For disposal in a smelter operating in accordance with §761.72(b):

(A) For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, <100 µg/100 cm2 as measured by a standard wipe test (§761.123) at locations selected in accordance with subpart P of this part.

(B) For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal), cleaning to Visual Standard No. 3, Commercial Blast Cleaned Surface Finish, of the National Association of Corrosion Engineers (NACE). A person shall verify compliance with standard No. 3 by visually inspecting all cleaned areas.

(4) The decontamination standard for concrete is ≤10 µg/100 cm2 as measured by a standard wipe test (§761.123) if the decontamination procedure is commenced within 72 hours of the initial spill of PCBs to the concrete or portion thereof being decontaminated.

- **40 C.F.R. §761.79 (e) – (g) reads:**

(e) Limitation of exposure and control of releases.

(1) Any person conducting decontamination activities under this section shall take necessary measures to protect against direct release of PCBs to the environment from the decontamination area.

(2) Persons participating in decontamination activities shall wear or use protective clothing or equipment to protect against dermal contact or inhalation of PCBs or materials containing PCBs.

(f) Sampling and recordkeeping.

(1) Confirmatory sampling is required under paragraph (b) of this section. For liquids described in paragraphs (b)(1) and (b)(2) of this section, sample in accordance with §§761.269 and 761.272. For non-porous surfaces and concrete described in paragraphs (b)(3) and (b)(4) of this section, sample in accordance with subpart P of this part. A written record of such sampling must be established and maintained for 3 years from the date of any decontamination under this section. The record must show sampling locations and analytical results and must be retained at the site of the decontamination or a copy of the record must be made available to EPA in a timely manner, if requested. In addition, recordkeeping is required in accordance with §761.180(a) for all wastes generated by a decontamination process and regulated for disposal under this subpart.

(2) Confirmatory sampling is not required for self-implementing decontamination procedures under paragraph (c) of this section. Any person using these procedures must retain a written record documenting compliance with the procedures for 3 years after completion of the decontamination procedures (e.g., video recordings, photographs).

(g) Decontamination waste and residues. Decontamination waste and residues shall be disposed of at their existing PCB concentration unless otherwise specified.

(1) Distillation bottoms or residues and filter media are regulated for disposal as PCB remediation waste.

(2) PCBs physically separated from regulated waste during decontamination (such as by chopping, shredding, scraping, abrading or oil/water separation, as opposed to solvent rinsing and soaking), other than wastes described in paragraph (g)(1) of this section, are regulated for disposal at their original concentration.

(3) Hydrocarbon solvent used or reused for decontamination under this section that contains <50 ppm PCB must be burned and marketed in accordance with the requirements for used oil in §761.20(e), disposed of in accordance with §761.60(a) or (e), or decontaminated pursuant to this section.

(4) Chlorinated solvent at any PCB concentration used for decontamination under this section shall be disposed of in an incinerator operating in compliance with §761.70, or decontaminated pursuant to this section.

(5) Solvents ≥50 ppm other than those described in paragraphs (g)(3) and (g)(4) of this section shall be disposed of in accordance with §761.60(a) or decontaminated pursuant to this section.

(6) Non-liquid cleaning materials and personal protective equipment waste at any concentration, including non-porous surfaces and other non-liquid materials such as rags, gloves, booties, other disposable personal protective equipment, and similar materials resulting from decontamination shall be disposed of in accordance with §761.61(a)(5)(v).

- **40 C.F.R. §761.79(c) (2) (i) reads:**

(c) Self-implementing decontamination procedures. The following self-implementing decontamination procedures are available as an alternative to the measurement-based decontamination methods specified in paragraph (b) of this section. Any person performing self-implementing decontamination must comply with one of the following procedures.

(2) Any person decontaminating movable equipment contaminated by PCBs, tools, and sampling equipment may do so by:

(i) Swabbing surfaces that have contacted PCBs with a solvent;

- **40 CFR §761.79 (g) reads:**

(g) Decontamination waste and residues. Decontamination waste and residues shall be disposed of at their existing PCB concentration unless otherwise specified.

(1) Distillation bottoms or residues and filter media are regulated for disposal as PCB remediation waste.

(2) PCBs physically separated from regulated waste during decontamination (such as by chopping, shredding, scraping, abrading or oil/water separation, as opposed to solvent rinsing and soaking), other than wastes described in paragraph (g)(1) of this section, are regulated for disposal at their original concentration.

(3) Hydrocarbon solvent used or reused for decontamination under this section that contains <50 ppm PCB must be burned and marketed in accordance with the requirements for used oil in §761.20(e), disposed of in accordance with §761.60(a) or (e), or decontaminated pursuant to this section.

(4) Chlorinated solvent at any PCB concentration used for decontamination under this section shall be disposed of in an incinerator operating in compliance with §761.70, or decontaminated pursuant to this section.

(5) Solvents ≥50 ppm other than those described in paragraphs (g)(3) and (g)(4) of this section shall be disposed of in accordance with §761.60(a) or decontaminated pursuant to this section.

(6) Non-liquid cleaning materials and personal protective equipment waste at any concentration, including non-porous surfaces and other non-liquid materials such as rags, gloves, booties, other disposable personal protective equipment, and similar materials resulting from decontamination shall be disposed of in accordance with §761.61(a)(5)(v).

ATTACHMENT 3

Safety Training Certificates

OSHAcampus.com™
powered by 360training.com

CERTIFICATE OF COURSE COMPLETION

Kurtis Jones	Hazwoper 40 Hour Course	01/07/2011 15:15 CST
Student's Name	Course Title	Course Completion Date MM / DD / YYYY
	1804943	40
Student's Signature	Certificate Number	Approved # of Hours

Note: Trainees must have additional hands-on training in the donning, doffing, and use of the Personal Protective Equipment required for their jobsite(s) in accordance with 29 CFR 1910.120.

IACET The Continuing Education Unit ®

360training.com, Inc. has been reviewed and approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 8405 Greensboro Drive, Suite 800, McLean, VA 22102-5120. 360training.com, Inc. has awarded 4 CEUs to participants who successfully complete this program.

5.0 Safety CM Points

I hereby attest and certify that I personally took the above named safety lesson in accordance to OshaCampus guidelines. I further state that I have paid for the course and that I did not use another's work (Plagiarism). Students should retain certificates and refer to course instructions to receive official certification where necessary.

360training
Corporate Headquarters
13801 N. Mo-Pac, Suite 100
Austin, Texas 78727
tel: 888-360-8764
fax: 512-727-7683
email: support@360training.com

Certificate of Completion

This is to certify that

Jim Burke

has successfully completed 30 hours of

OSHA Contruction Safety & Health

June 29, 2005

Rick Gleason, CIH, CSP

Instructor: Rick Gleason

Prezant

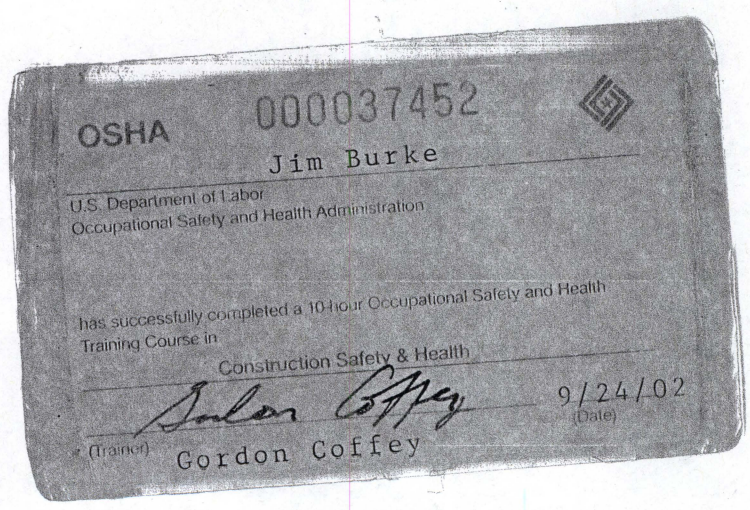
THE NORTHWEST'S LEADING TRAINING ORGANIZATION

Cert # 05-1948

Conducted by:

Prezant Associates, Inc., Seattle, WA

Prezant Associates, Inc. • 1730 Minor Avenue North, Suite 900 • Seattle, Washington 98101 • (206) 281-8858


OSHA 00037452

Jim Burke

U.S. Department of Labor
Occupational Safety and Health Administration

has successfully completed a 10-Hour Occupational Safety and Health Training Course in

Construction Safety & Health

Gordon Coffey 9/24/02
(Trainer) (Date)

Gordon Coffey

OSHACAMPUS.com™
powered by 360training

CERTIFICATE OF COURSE COMPLETION

Matt Clayton	40 Hr HAZWOPER	07/26/2011 21:52 CST
Student's Name	Course Title	Course Completion Date MM / DD / YYYY

2024067
Certificate Number

	40
Student's Signature	Approved # of Hours

I hereby attest and certify that I personally took the above named safety lesson in accordance to Osha Campus guidelines. I further state that I have paid for the course and that I did not use another's work (Plagiarism). Students should retain certificates and refer to course instructions to receive official certification where necessary.

360training
Corporate Headquarters
13801 N. Mo-Pac, Suite 100
Austin, Texas 78727
tel: 888-360-8764
fax: 512-727-7683
email: support@360training.com

Certificate of Completion

To all who shall see these presents,
be it known

Nathan Hoffman

has successfully completed

HAZWOPER

40 hour initial training course

Hazardous Waste Operations & Emergency Response

On this **21st** day of **September, 2005**

Conducted in accordance with
Washington Administrative Code 296-62-3040
&
29 Code of Federal Regulations 1910.120
as required for hazardous materials remediation and spill response workers in the ***State of Washington.***

Bill Gaul — 21 SEP '05

Instructor — *Date*

BGA – Bill Gaul & Associates – SOS
Supporting Occupational Safety with Training, Consulting, Site Work, and Supplies
6206 53rd Ave NE, Marysville, WA 98270
(800) 375-0928 fax (360) 658-0947
since 1982

Certificate of Completion

360training.com™

This Certifies That

Orlando Alvarez

is awarded this certificate for

HAZWOPER 40 HR

Credit Hours: 40

Completion Date: 07/20/2013 19:30 CST

CEU: 4.0

Marie Athey, OSHA Trainer

360training.com, Inc. has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102.

This course complies with OSHA 29 CFR 1910.120.

360training.com ♦ 13801 Burnet Rd., Suite 100 ♦ Austin, TX 78727 ♦ 888-360-TRNG ♦ www.360training.com

Northwest EnviroService Inc.

Scanner

CERTIFICATE OF TRAINING

This certificate certifies that

PAUL CURNETT ON THIS DAY, MARCH 1, 1991

has completed

FORTY HOURS HEALTH & SAFETY TRAINING FOR HAZARDOUS MATERIALS ACCORDING TO OSHA 1910.120

Bm Sommerfeldt

for Northwest EnviroService
TOM SOMMERFELDT - SAFETY DIRECTOR

TCB EDUCATIONAL SERVICES

40 Hour HAZWOPER

Name: Tom Dodds

Course Date: July 9-12, 2001

Certificate #: 40HR-071201-248

Exp. Date: 071202

in compliance with 29 CFR 1910.120

Health & Safety Training

40-Hour Initial

This Certifies That

Dan Hawk

Has completed forty hours of training toward fulfillment of initial training requirements for hazardous waste/materials workers under OSHA 29 CFR 1910.120

Phillip L. Jones, M.S., C.I.H.
Health and Safety Manager

Rod D. Petri, M.S., C.E.T.
Training Program Manager

Course Date: **May 28-31, 1986**

Course Location: **Denver, CO**

Serial Number: **86-029**

Woodward-Clyde

Engineering & sciences applied to the earth & its environment

ATTACHMENT 4

KCIW Water Discharge Authorization

King County
Wastewater Treatment Division
Industrial Waste Program
Department of Natural Resources and Parks
201 South Jackson Street, Suite 513
Seattle, WA 98104-3855
206-477-5300 Fax 206-263-3001
TTY Relay: 711

June 30, 2016

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Garland Jewell
Jorgensen Forge Corp.
8531 E. Marginal Way S.
Seattle, WA 98108

Issuance of Wastewater Discharge Authorization No. 4377-01 to Jorgensen Forge Corp. – Outfall Site Stage 2 CMP Removal Construction Project

Dear Mr. Jewell:

The King County Industrial Waste Program (KCIW) has reviewed your application to discharge construction dewatering to the sewer system from the Jorgensen Forge Corp. – Outfall Site Stage 2 CMP Removal Construction Project construction project located at 8531 East Marginal Way South, Seattle, Washington, and has issued the enclosed Major Discharge Authorization.

This authorization permits you to discharge limited amounts of industrial wastewater into King County's sewer system in accordance with the effluent limitations and other requirements and conditions set forth in the document and the regulations outlined in King County Code 28.84.060 (enclosed). As long as you maintain compliance with regulations and do not change the nature and volume of your discharge, KCIW will not require you to apply for an industrial wastewater discharge permit, a type of approval that would result in additional requirements and increased fees.

If you propose to increase the volume of your discharge or change the type or quantities of substances discharged, you must contact KCIW at least 60 days before making these changes.

King County Code 28.84 authorizes a fee for each Major Discharge Authorization issued by the King County Department of Natural Resources and Parks. The current fee for issuance of a Major Discharge Authorization is $2,280. King County will send you an invoice for this amount.

If you have any questions about this discharge authorization or your wastewater discharge, please call me at 206-477-5476, or email me at ryan.salem@kingcounty.gov. You may also wish to visit our program's Internet pages at: www.kingcounty.gov/industrialwaste.

Thank you for helping support our mission to protect public health and enhance the environment.

Sincerely,

Ryan Salem
Compliance Investigator

Enclosures

cc: Jim Mahady, Seattle Public Utilities

King County

MAJOR DISCHARGE AUTHORIZATION
King County Industrial Waste Program
201 S. Jackson Street, Suite 513
Seattle, WA 98104-3855

NUMBER 4377-01
for

Jorgensen Forge Corp. – Outfall Site Stage 2 CMP Removal Construction Project

Site address: 8531 East Marginal Way S.
Seattle, WA 98108

Mailing address: 8531 E. Marginal Way S.
Seattle, WA 98108

Phone: 206-762-1100

Emergency (24-hour) phone: 206-351-2412

Industry type: Construction Dewatering

Discharge to: West Point Treatment Plant

*Note: This authorization is valid only for the specific discharges shown below:

Discharge process: Wastewater generated by construction dewatering operation

Effective date: July 15, 2016
Expiration date: September 15, 2016

DESCRIPTION OF SAMPLE SITES AND DISCHARGE VOLUMES

Sample Site No.	Description	Maximum Daily Discharge Volume (gpd)	Maximum Discharge Rate (gpm)
IW1303A	Discharge pipe after last point of treatment	288,000	200

Permission is hereby granted to discharge industrial wastewater from the above-identified site into the King County sewer system in accordance with the effluent limitations and monitoring requirements set forth in this authorization.

If the industrial user wishes to continue to discharge after the expiration date, an application must be filed for re-issuance of this discharge authorization at least 90 days prior to the expiration date. For information concerning this King County Discharge Authorization, please call Industrial Waste Compliance Investigator Ryan Salem at 206-477-5476.

24-HOUR EMERGENCY NOTIFICATION

West Point Treatment Plant: 206-263-3801
Washington State Department of Ecology: 425-649-7000

SPECIAL CONDITIONS

A. Granulated Activated Carbon (GAC) Vessels Breakthrough Monitoring Requirements

1. Jorgensen Forge Corp. shall collect weekly samples between the lead and lag GAC vessels (mid GAC) to check for breakthrough and have samples run on a 48-hour turn around or shorter. Samples must be analyzed for PCBs with a method detection limit not to exceed 0.1 µg/L.

2. The mid GAC sample results required by the permit shall be retained on site for a period of three years and shall be available for review at reasonable times by authorized representatives of KCIW

3. If PCBs (per aroclor, see Self-Monitoring Requirements footnote) are detected in the effluent of the lead GAC unit at concentrations exceeding the established discharge limit (see General Discharge Limits), the permittee shall cease treatment and discharge to the sanitary sewer system until GAC change out of the lead unit is performed.

B. In accordance with Seattle Public Utilities requirements the discharge point will be to an existing sanitary side sewer or as otherwise directed.

C. **No later than August 1, 2016**, the permittee must submit a list of Jorgensen Forge Corp. and contractor personnel responsible for dewatering activities, including operation and maintenance of the wastewater treatment system and monitoring of the discharge to the sanitary sewer. The list shall include the site contacts' name, title, company, and phone numbers (office and cell).

D. Discharge to the sanitary sewer shall not begin until KCIW has conducted a preoperative inspection of the pretreatment facilities and has sent written notification (email is sufficient) to the permittee that discharges may begin.

E. All persons responsible for monitoring the discharge to the sanitary sewer shall review a copy of this authorization.

F. A copy of this authorization shall be on site at all times for review and reference.

G. This authorization grants the discharge of limited amounts of wastewater from the following waste streams:

1. Contaminated stormwater runoff
2. Excavation dewatering
3. Decontamination water

Wastes or contaminants from sources other than permitted herein shall not be discharged to the sanitary sewer without prior approval from KCIW.

H. The discharge shall not cause hydraulic overloading conditions of the sewerage conveyance system. During periods of peak hydraulic loading KCIW and Seattle Public Utilities representatives reserve the authority to request that discharge to the sewer be stopped.

I. All wastewater shall be collected and treated in accordance with treatment methods approved by KCIW. Wastewater shall not bypass treatment systems. Modifications to wastewater treatment systems shall not occur without prior approval from KCIW.

J. Totalizing and non-resettable flow meters must be installed on all permitted discharge pipes to the sewer.

K. An accessible sampling spigot must be installed on the discharge pipe from the last treatment unit of the wastewater treatment system. The sample site shall be representative of all industrial waste streams discharged to the sewer from this site. The sample site shall be accessible to KCIW representatives when discharge to the sewer is occurring.

L. The contractor shall implement erosion control best management practices to minimize the amount of solids discharged to the sanitary sewer system. As a minimum precaution, the wastewater must be pumped to an appropriately sized settling tank(s) prior to entering the sewer system.

M. The permittee shall properly operate and maintain all wastewater treatment units to ensure compliance with established discharge limits. Solids accumulation in tanks used for solids settling shall not exceed 25 percent of the tank's working hydraulic capacity. Each tank's working hydraulic capacity is based on the water column height as measured from the bottom of the tank to either the invert elevation of the tank's outlet pipe (gravity discharges) or discharge pump intake (pumped discharges).

N. Results of all required self-monitoring sampling must be recorded daily. Recorded information for each discharge site must include:

1. Sample date
2. Sample time
3. Sample results
4. Operator name
5. Comments (if applicable)

These records shall be maintained on site and shall be available for review by KCIW personnel during normal business hours.

O. The permittee must establish a sewer account with Seattle Public Utilities and provide necessary reports to ensure accurate assessment of sewer charges for all construction dewatering discharge sites associated with this project.

SELF-MONITORING REQUIREMENTS

A. The following self-monitoring requirements shall be met for this discharge authorization:

Sample Site No.	Parameter	Sample Type	Frequency
IW1303A	Daily Discharge Rate	Continuous	Daily
	Flow Rate	Grab (field)	Daily
	Settleable Solids, Volumetric	Grab	Daily
	PCBs[1]	Grab	First day of discharge and weekly thereafter
	Hydrogen sulfide	Meter reading	Only if operating criteria are exceeded
	Explosivity	Meter reading	Only if operating criteria are exceeded

B. The settleable solids field test by Imhoff cone must be performed as follows:

1. Fill Imhoff cone to one-liter mark with well-mixed sample
2. Allow 45 minutes to settle
3. Gently stir sides of cone with a rod or by spinning; settle 15 minutes longer
4. Record volume of settleable matter in the cone as ml/L

C. If a violation of any discharge limits or operating criteria is detected in monitoring, you shall notify KCIW immediately upon receipt of analytical data.

D. A self-monitoring report shall be filed with KCIW no later than the 15th day of the time period following the sample collection (e.g., the 15th day of the following month for monthly, weekly, daily samples; the 15th day of the following quarter for quarterly samples). If no discharge takes place during any monitoring period, it shall be noted on the report.

E. All self-monitoring data submitted to KCIW, which required a laboratory analysis, must have been performed by a laboratory accredited by the Washington State Department of Ecology for each parameter tested, using procedures approved by 40 CFR 136. This does not apply to field measurements performed by the industrial user such as pH, temperature, flow, atmospheric hydrogen sulfide, total dissolved sulfides, total settleable solids by Imhoff cone, or process control information.

F. All sampling data collected by the permittee and analyzed using procedures approved by 40 CFR 136, or approved alternatives, shall be submitted to KCIW whether required as part of this authorization or done voluntarily by the permittee.

[1] PCBs must be reported per Aroclor (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260); each Aroclor must meet the discharge limits listed under General Discharge Limitations

G. Self-monitoring reports shall be signed by an authorized representative of the industrial user. The authorized representative of the industrial user is defined as:

1. The president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation

2. The manager of one or more manufacturing, production, or operating facilities, but only if the manager:

   a. Is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiate and direct other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations
   b. Can ensure that the necessary systems are established or actions taken to gather complete and accurate information for control mechanism requirements and knowledgeable of King County reporting requirements
   c. Has been assigned or delegated the authority to sign documents, in accordance with corporate procedures

3. A general partner or proprietor if the industrial user is a partnership or proprietorship, respectively

4. A director or highest official appointed or designated to oversee the operation and performance of the industry if the industrial user is a government agency

5. The individuals described in one through four above may designate an authorized representative if:

   a. The authorization is submitted to King County in writing.
   b. The authorization specifies the individual or position responsible for the overall operation of the facility from which the discharge originates or having overall responsibility for environmental matters for the company or agency.

GENERAL DISCHARGE LIMITATIONS

Operating criteria

There shall be no odor of solvent, gasoline, or hydrogen sulfide (rotten egg odor), oil sheen, unusual color, or visible turbidity. The discharge must remain translucent. If any of the discharge limits are exceeded, you must stop discharging and notify KCIW at 206-477-5300.

Corrosive substances

Limits

Maximum:	pH 12.0 (s.u.)
Instantaneous minimum:	pH 5.0 (s.u.)
Daily minimum:	pH 5.5 (s.u.)

The instantaneous minimum pH limit is violated whenever any single grab sample or any instantaneous recording is less than pH 5.0. The daily minimum pH limit is violated whenever any continuous recording of 15 minutes or longer remains below pH 5.5 or when each pH value of four consecutive grab samples collected at 15-minute intervals or longer within a 24-hour period remains below pH 5.5.

Discharges of more than 50 gallons per day of caustic solutions equivalent to more than 5 percent NaOH by weight or greater than pH 12.0 are prohibited unless authorized by KCIW and subject to special conditions to protect worker safety, the collection system, and treatment works.

Fats, oils, and grease

Discharge of FOG shall not result in significant accumulations that either alone or in combination with other wastes are capable of obstructing flow or interfere with the operation or performance of sewer works or treatment facilities.

Dischargers of polar FOG (oil and grease from animal and/or vegetable origin) shall minimize free-floating polar FOG. Dischargers may not add emulsifying agents exclusively for the purpose of emulsifying free-floating FOG.

Nonpolar FOG limit: 100 mg/L

The limit for nonpolar FOG is violated when the arithmetic mean of the concentration of three grab samples, taken no more frequently than at five minute intervals, or when the results of a composite sample exceed the limitation.

Flammable or explosive materials

No person shall discharge any pollutant, as defined in 40 CFR 403.5, that creates a fire or explosion hazard in any sewer or treatment works, including, but not limited to, waste streams with a closed cup flashpoint of less than 140° Fahrenheit or 60° Centigrade using the test methods specified in 40 CFR 261.21.

At no time shall two successive readings on an explosion hazard meter, at the point of discharge into the system (or at any point in the system), be more than 5 percent nor any single reading be more than 10 percent of the lower explosive limit (LEL) of the meter.

Pollutants subject to this prohibition include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides, and any other substances that King County, the fire department, Washington State, or the U.S. Environmental Protection Agency has notified the user are a fire hazard or a hazard to the system.

Petroleum Compounds	Maximum Concentration ppm (mg/L)
Benzene	0.07
Ethylbenzene	1.7
Toluene	1.4
Total xylenes	2.2

Heavy metals/cyanide

The industrial user shall not discharge wastes, which exceed the following limitations:

Heavy Metals & Cyanide	Instantaneous Maximum ppm (mg/L)[1]	Daily Average ppm (mg/L)[2]
Arsenic	4.0	1.0
Cadmium	0.6	0.5
Chromium	5.0	2.75
Copper	8.0	3.0
Lead	4.0	2.0
Mercury	0.2	0.1
Nickel	5.0	2.5
Silver	3.0	1.0
Zinc	10.0	5.0
Cyanide	3.0	2.0

[1]The instantaneous maximum is violated whenever the concentration of any sample, including a grab within a series used to calculate daily average concentrations, exceeds the limitation.

[2]The daily average limit is violated: a) for a continuous flow system when a composite sample consisting of four or more consecutive samples collected during a 24-hour period over intervals of 15 minutes or greater exceeds the limitation, or b) for a batch system when any sample exceeds the limitation. A composite sample is defined as at least four grab samples of equal volume taken throughout the processing day from a well-mixed final effluent chamber, and analyzed as a single sample.

High temperature

The industrial user shall not discharge material with a temperature in excess of 65° C (150° F).

Hydrogen sulfide

Atmospheric hydrogen sulfide: 10.0 ppm
(As measured at a monitoring manhole designated by KCIW)

Soluble sulfide limits may be established on a case-by-case basis depending upon volume of discharge and conditions in the receiving sewer, including oxygen content and existing sulfide concentrations.

Organic compounds

No person shall discharge any organic pollutants that result in the presence of toxic gases, vapors, or fumes within a public or private sewer or treatment works in a quantity that may cause worker health and safety problems.

Organic pollutants subject to this restriction include, but are not limited to: Any organic pollutants compound listed in 40 CFR Section 433.11 (e) (total toxic organics [TTO] definition), acetone, 2-butanone (MEK), 4-methyl-2-pentanone (MIBK), and xylenes.

Organic compound screening levels

Tetrachloroethylene (Perchloroethylene/PCE)	0.24 mg/L
Trichloroethylene (TCE)	0.5 mg/L
Vinyl chloride	0.012 mg/L
Chloroform (Trichloromethane)	0.060 mg/L
Trichloroethane	2.7 mg/L
Dichloroethylene, 1,2- (Total - *cis* & *trans*)	2.0 mg/L

Polychlorinated Biphenyls (PCBs)

Limits for PCBs are per Aroclor.

PCBs (per Aroclor)	CAS Number	Limit (µg/L)
Aroclor 1016	12674-11-2	**0.1**
Aroclor 1221	1104-28-2	**0.1**
Aroclor 1232	11141-16-5	**0.1**
Aroclor 1242	53469-21-9	**0.1**
Aroclor 1248	12672-29-6	**0.1**
Aroclor 1254	11141-16-5	**0.1**
Aroclor 1260	11096-82-5	**0.1**

Settleable solids

Settleable solids concentrations: 7.0 ml/L

GENERAL CONDITIONS

A. All requirements of King County Code pertaining to the discharge of wastes into the municipal sewer system are hereby made a condition of this discharge authorization.

B. The industrial discharger shall implement measures to prevent accidental spills or discharges of prohibited substances to the municipal sewer system. Such measures include, but are not limited to, secondary containment of chemicals and wastes, elimination of connections to the municipal sewer system, and spill response equipment.

C. Any facility changes, which will result in a change in the character or volume of the pollutants discharged to the municipal sewer system, must be reported to your KCIW representative. Any changes that will cause the violation of the effluent limitations specified herein will not be allowed.

D. In the event the permittee is unable to comply with any of the conditions of this discharge authorization because of breakdown of equipment or facilities, an accident caused by human error, negligence, or any other cause, such as an act of nature the company shall:

1. Take immediate action to stop, contain, and clean up the unauthorized discharges and correct the problem.
2. Immediately notify KCIW and, if after 5 p.m. weekdays and on weekends, call the emergency King County treatment plant phone number on Page 1 so steps can be taken to prevent damage to the sewer system.
3. Submit a written report within 14 days of the event (*14-Day Report*) describing the breakdown, the actual quantity and quality of resulting waste discharged, corrective action taken, and the steps taken to prevent recurrence.

E. Compliance with these requirements does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of the discharge authorization or the resulting liability for failure to comply.

F. The permittee shall, at all reasonable times, allow authorized representatives of KCIW to enter that portion of the premises where an effluent source or disposal system is located or in which any records are required to be kept under the terms and conditions of this authorization.

G. Nothing in this discharge authorization shall be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations including discharge into waters of the state. Any such discharge is subject to regulation and enforcement action by the Washington State Department of Ecology.

H. This discharge authorization does not authorize discharge after its expiration date. If the permittee wishes to continue to discharge after the expiration date, an application must be filed for reissuance of this discharge authorization at least 90 days prior to the expiration date. If the permittee submits its reapplication in the time specified herein, the permittee shall be deemed to have an effective wastewater discharge authorization until KCIW issues or denies the new wastewater discharge authorization. If the permittee fails to file its reapplication in the time period specified herein, the permittee will be deemed to be discharging without authorization.

Compliance Investigator: _____ Date: June 30, 2016
Ryan Salem

King County

Industrial Waste Program Monthly Self-Monitoring Report

Send to: King County Industrial Waste Program
201 S. Jackson Street, Suite 513
Seattle, WA 98104-3855
Phone 206-477-5300 / FAX 206-263-3001
Email: info.kciw@kingcounty.gov

Company Name: Jorgensen Forge Corp. - Outfall Site Stage 2 CMP Removal Construction Project **Sample Site No.** IW1303A **Permit/DA No.:** 4377-01

Please Specify Month & Year: **Month:** _____ **20**____

This form is available at: www.kingcounty.gov/industrialwaste.

All units are mg/l unless otherwise noted.

Sample Date	Settleable Solids (mL/L)	Aroclor 1016 (µg/L)	Aroclor 1221 (µg/L)	Aroclor 1232 (µg/L)	Aroclor 1242 (µg/L)	Aroclor 1248 (µg/L)	Aroclor 1254 (µg/L)	Aroclor 1260 (µg/L)	Maximum Daily Flow Rate (gallons per minute)	Daily Flow (gallons per day)	Notes If relief only, indicate why discharging to sanitary sewer.
1											
2											
3											
4											
5											
6											
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9											
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25											
26											
27											
28											
29											
30											
31											

Total Monthly Flow (gallons) _____

Maximum Daily Flow _____ & Date _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that all data requiring a laboratory analysis were analyzed by a Washington State Department of Ecology accredited laboratory for each parameter tested.

Signature of Principal Executive or Authorized Agent _____ Date _____

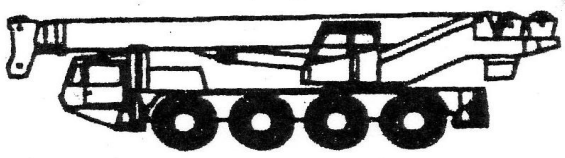
PLEASE CIRCLE ALL VIOLATIONS

Due Date: Monthly report is due by the 15th each month.

ATTACHMENT 5

Major Equipment Specifications

FORD CRANE
INC.



P.O. Box 2497
Snohomish, WA 98291

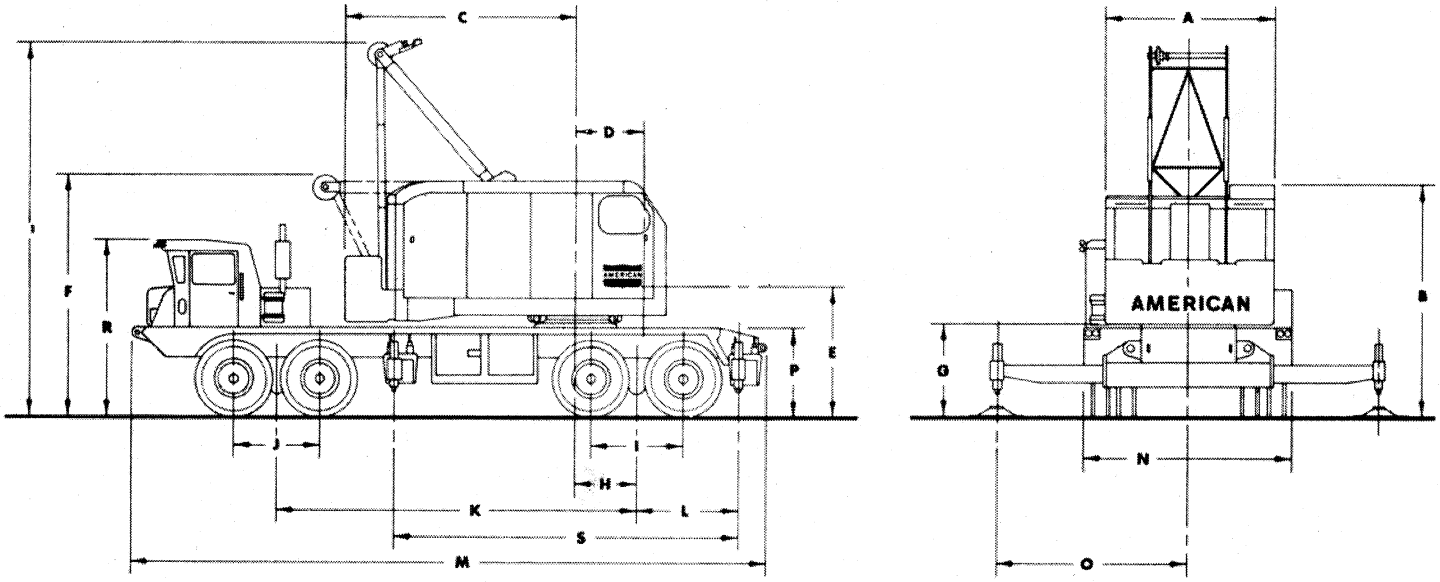
AMERICAN

TRUCK CRANE

Model 7530

125 Ton Lattice Boom

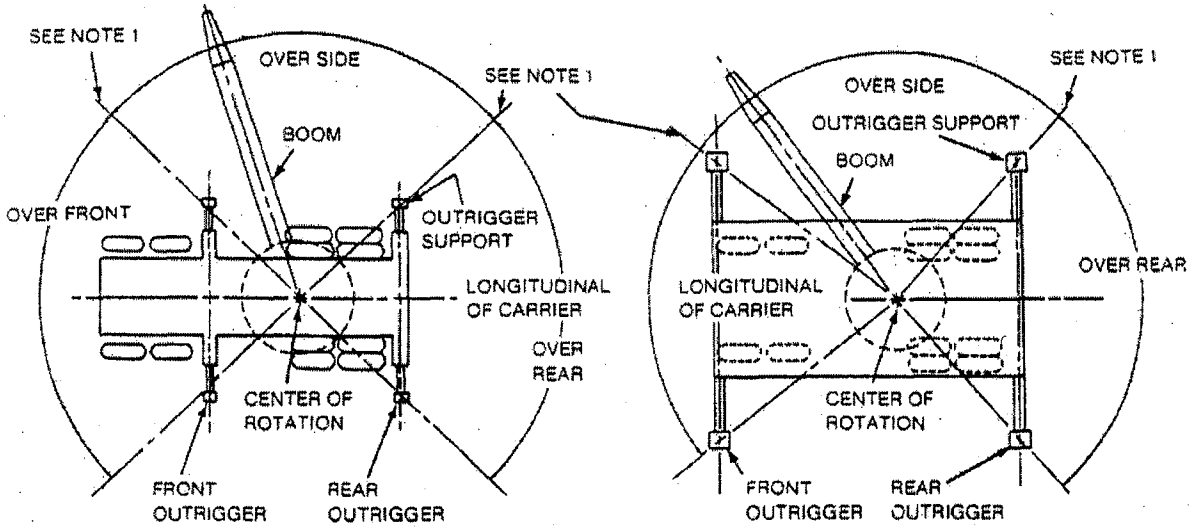
GENERAL DIMENSIONS



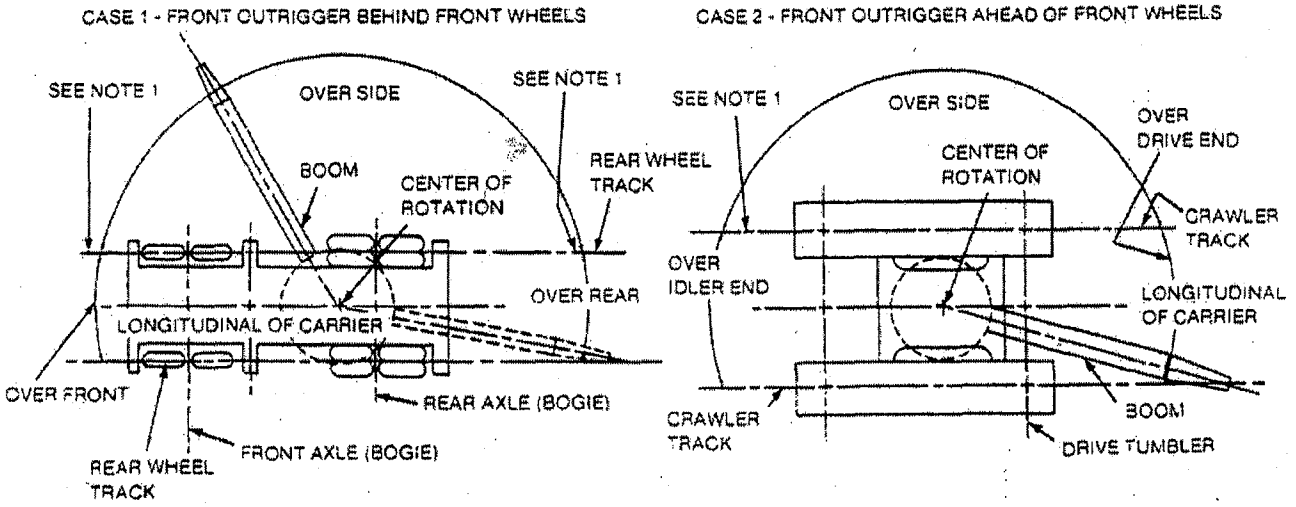
A.	Width of cab	10'6"	
B.	Height to top of cab	12' 11 ¼"	
C.	Tail Swing	14' 1 ½	
D.	Centerline of rotation to centerline of boom foot	4' 1 ½	
E.	Ground to centerline boom foot	6' 9 ½	
F.	Height over A-Frame (lowered)	13'5"	
F1.	Height over A-Frame (raised)	21' 9 ¼"	
G.	Ground to bottom of counterweight	5'2"	
H.	Centerline of rotation to centerline of rear bogie	3'6"	
I.	Distance between rear axles	5'4"	
J.	Distance between front axles	5'0"	
K.	Centerline of rear bogie to centerline of front bogie	19'10"	
L.	Centerline of rear bogie to centerline of rear outrigger	6' 5 ½	
M.	Overall length	35'8"	
N.	Overall width	11'0"	
O.	Outriggers extended w/hydraulic outriggers	11'0"	
P.	Height over mounting plate	4'5"	
R.	Height over carrier cab	9'3"	
S.	Centerline of rear outrigger to centerline of front outrigger	20' 4 ½	
	Turning radius	55'0"	
	Clearance (under rear equalizing beam)	7 ¾"	
	Clearance (under rear differential)	15 ¼"	

*Gross Weight without Counter Weight 132,800 lbs

*Counter Weight 34,0000 lbs
Hammerhead Boom Tip 6,000 lbs
Boom Sections 100lbs per foot



CARRIERS ON OUTRIGGERS



CARRIER ON TIRES *CRAWLER TYPE LOWER*

WORKING AREA DEFINITIONS

NOTE 1
These lines determine the limiting position of any load for operation within working areas indicated.

CRANE RATING DATA

Load ratings are in pounds and do not exceed 85% of the load which would cause tipping with crane standing level on firm uniformly supporting surface. Safe loads depend on ground conditions, boom length, radius of operation, and proper handling, all of which must be taken into consideration by user.

Tire inflation pressure for "Free Ratings" is 100 P.S.I. Free ratings do not exceed maximum permissible tire load. Tire pressure shall be reduced for over-the-road travel.

Approved working areas "Free Over Side" and "Free Over Rear" are shown under Diagram No. 1. Approved working areas "Outriggers Extended and Set Over Side or Rear" are shown under Diagram No. 2.

"Radius in feet" is the horizontal distance at crane base level from center pin to a vertical line through the center of gravity of the suspended load.

Lifting is approved only in those areas for which ratings are shown in the rating chart. Blocks, slings, buckets, and other load carrying devices are considered part of the load. Retractable A-frame must be in fully raised position for all ratings. Ratings in shaded areas are limited by strength of material or factors other than stability.

Main load line is 1 inch diameter with a minimum breaking strength of 89,800 pounds. Boom suspension line is 3/4 inch diameter with a minimum breaking strength of 51,200 pounds. Boom suspension pendants are 1-1/2 inch diameter with a minimum breaking strength of 250,000 pounds.

Boom and jib erection is over the rear of the machine with outriggers extended, and set and with "Lift Rating" counterweight. A-frame must be fully raised and blocks, slings and other load carrying devices must be on the ground.

Compliance to B30.5 based on AMERICAN® carrier mounting.

Designed and rated to comply with ANSI Code B30.5.

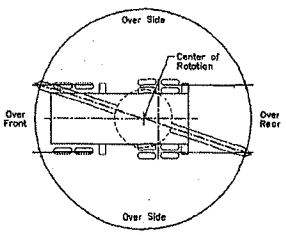


DIAGRAM NO 1
FREE RATINGS

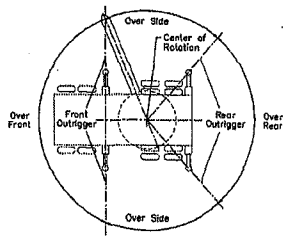


DIAGRAM NO 2
OUTRIGGERS EXTENDED AND SET

BOOM AND JIB ERECTION

59H Tubular Boom	Max. Jib Length	
	No. 9H L	No. 9
*220 Tapered Tip	80'	50'
160' Hammerhead	60'	50'

NOTE: For erection of boom length above 200 ft., the boom foot supports and 7,500 lb. front bumper counterweight must be utilized.

LOAD HOISTING DATA

Maximum Lifting Capacity - Lbs.	Minimum Pts. of Line	Maximum Hoisting Distance – Ft.	
		Main Drum - RH	Aux. Drum - LH
250,000	10	57	35
230,910	9	64	39
205,260	8	72	44
179,600	7	82	51
153,940	6	96	59
128,280	5	115	71
102,630	4	144	89
76,970	3	192	119
51,310	2	288	179
25,660	1	576	358

*With controlled load lowering (one drum). Main load line 1 inch diameter with minimum breaking strength of 89,800 lbs.

NOTE: In accordance with varying material situations and the Company's policy of constant product improvement these specifications subject to change without notice and without incurring responsibility to units previously sold.

BOOM COMPOSITION

59H TUBULAR HAMMERHEAD BOOM

Boom Length In Feet	20 Ft. 59SH Inner	10 Ft. 59H Center	20 Ft. 59H Center	40 Ft. 59H Center	20 Ft. 59H Outer Base	Hammer-head
40	1	-	-	-	1	1
50	1	1	-	-	1	1
60	1	-	1	-	1	1
70	1	1	1	-	1	1
80	1	-	-	1	1	1
90	1	1	-	1	1	1
100	1	-	1	1	1	1
110	1	1	1	1	1	1
120	1	-	-	2	1	1
130	1	1	-	2	1	1
140	1	-	1	2	1	1
150	1	1	1	2	1	1
160	1	-	-	3	1	1

Hammerhead Tip Offset 1.75'

59H TUBULAR TAPERED TIP BOOM

Boom Length In Feet	20 Ft. 59SH Inner	10 Ft. 59H Center	20 Ft. 59H Center	40 Ft. 59H Center	20 Ft. 59H Outer Base	20 Ft. 59SH Tapered Tip
60	1	-	-	-	1	1
70	1	1	-	-	1	1
80	1	-	1	-	1	1
90	1	1	1	-	1	1
100	1	-	-	1	1	1
110	1	1	-	1	1	1
120	1	-	1	1	1	1
130	1	1	1	1	1	1
140	1	-	-	2	1	1
150	1	1	-	2	1	1
160	1	-	1	2	1	1
170	1	1	1	2	1	1
180	1	-	-	3	1	1
190	1	1	-	3	1	1
200	1	-	1	3	1	1
*210	1	1	1	3	1	1
*220	1	-	-	4	1	1

LIFT RATINGS

With 59H Tubular Hammerhead Boom and "K-F-L-M" Counterweight (34,000 lbs.)

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	11	82.8	-	91090	250000	250000	47	10
	12	81.3	-	87730	250000	250000	47	10
	15	77.0	-	78920	205060	205060	46	8
40	20	69.6	-	67160	145190	145190	45	6
feet	25	61.7	31390	50680	111910	111910	43	5
	30	53.1	26050	40390	90710	90710	39	4
	35	43.3	22060	33350	73810	74420	35	3
	40	30.9	18960	28220	60380	61380	28	3
	13	81.9	-	84120	238730	238730	57	10
	15	79.6	-	78460	205030	205030	57	8
	20	73.8	-	67040	145120	145120	55	6
50	25	67.7	31160	50630	111830	111830	54	5
feet	30	61.3	25840	40330	90630	90630	51	4
	35	54.5	21880	33300	73910	74490	48	3
	40	47.0	18810	28170	60470	61440	44	3
	50	27.4	14330	21180	43860	45050	30	2
	14	82.3	-	80690	221500	221500	67	9
	15	81.3	-	77970	204910	204910	67	8
	20	76.5	38380	66580	144970	144970	66	6
60	25	71.6	30860	50500	111670	111670	64	5
feet	30	66.5	25560	40200	90460	90460	62	4
	35	61.1	21610	33160	73920	74480	60	3
	40	55.5	18560	28040	60450	61410	57	3
	50	42.6	14120	21070	43850	45010	48	2
	60	24.8	11030	16530	33960	35110	32	2
	15	82.6	-	77450	204750	204750	77	8
	20	78.5	38040	66100	144780	144780	76	6
	25	74.3	30540	50340	111460	111460	75	5
70	30	70.0	25240	40030	90250	90250	73	4
feet	35	65.6	21310	32990	73880	74410	71	3
	40	61.0	18270	27870	60390	61320	69	3
	50	51.0	13850	20910	43760	44920	62	2
	60	39.3	10800	16380	33890	35030	52	2
	70	22.9	8530	13180	27320	28390	34	2
	16	82.8	-	74460	189050	189050	87	8
	20	79.9	37730	65680	144600	144600	86	6
	25	76.3	30240	50190	111270	111270	85	5
	30	72.6	24960	39870	90050	90050	84	4
80	35	68.8	21030	32830	73830	74340	82	3
feet	40	64.9	18000	27700	60320	61240	80	3
	50	56.6	13600	20750	43670	44810	74	2
	60	47.5	10560	16230	33790	34920	66	2
	70	36.6	8330	13050	27230	28300	55	2
	80	21.3	6580	10670	22540	23530	36	1
	17	83.0	43570	71550	175420	175420	97	7
	20	81.0	37360	65180	144370	144370	96	6
	25	77.8	29880	49990	111020	111020	95	5
	30	74.5	24610	39670	89790	89790	94	4
90	35	71.2	20690	32610	73740	74230	93	3
feet	40	67.8	17660	27490	60200	61100	91	3
	50	60.7	13280	20530	43520	44660	86	2
	60	53.1	10260	16020	33630	34750	79	2
	70'	44.6	8030	12850	27080	28130	70	2
	80	34.4	6320	10490	22400	23380	58	1
	90	20.0	4940	8640	18880	19780	38	1
	19	82.5	38860	66670	153230	153230	107	6
100	20	81.9	36970	64670	144120	144120	107	6
feet	25	79.0	29500	49780	110760	110760	106	5
	30	76.1	24240	39450	89520	89520	105	4
	35	73.2	20330	32390	73640	74100	103	3

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	40	70.1	17310	27260	60070	60950	102	3
	50	63.9	12940	20300	43360	44480	97	2
100	60	57.3	9920	15790	33460	34570	92	2
feet	70	50.2	7710	12620	26900	27940	84	2
cont.	80	42.1	6020	10270	22220	23190	74	1
	90	32.5	4660	8440	18710	19610	61	1
	100	18.9	3540	6970	15970	16800	39	1
	20	82.7	36580	64160	143870	143870	117	6
	25	80.0	29120	49560	110490	110490	116	5
	30	77.4	23870	39220	89240	89240	115	4
	35	74.7	19960	32150	73520	73960	114	3
	40	72.0	16950	27020	59930	60800	112	3
110	50	66.4	12590	20060	43190	44300	108	2
feet	60	60.6	9580	15540	33270	34370	103	2
	70	54.4	7380	12380	26700	27740	97	2
	80	47.7	5690	10030	22020	22990	89	1
	90	40.1	4350	8210	18520	19410	78	1
	100	31.0	3260	6760	15790	16610	64	1
	110	18.0	2330	5560	13580	14350	41	1
	21	82.8	34500	61830	135520	135520	127	6
	25	80.9	28780	49370	110240	110240	126	5
	30	78.5	23530	39010	88980	88980	125	4
	35	76.0	19630	31940	73410	73830	124	3
	40	73.5	16620	26800	59790	60640	123	3
120	50	68.5	12270	19830	43030	44120	119	2
feet	60	63.3	9270	15320	33090	34190	115	2
	70	57.8	7080	12150	26520	27550	109	2
	80	51.9	5400	9810	21830	22790	102	1
	90	45.5	4060	8000	18330	19220	93	1
	100	38.3	2980	6550	15600	16420	82	1
	110	29.6	2070	5360	13410	14180	66	1
	120	17.2	1280	4360	11600	12310	42	1
	22	82.9	32520	58060	127970	127970	137	5
	25	81.6	28400	49150	109970	109970	136	5
	30	79.4	23150	38780	88700	88700	135	4
	35	77.1	19260	31700	73280	73690	134	3
	40	74.8	16250	26560	59640	60480	133	3
130	50	70.2	11910	19580	42850	43930	130	2
feet	60	65.5	8920	15070	32890	33980	126	2
	70	60.5	6730	11900	26310	27330	121	2
	80	55.3	5060	9560	21620	22570	114	1
	90	49.7	3730	7750	18110	18990	107	1
	100	43.6	2650	6300	15380	16200	97	1
	110	36.7	1750	5120	13200	13960	85	1
	120	28.4	990	4130	11400	12110	69	1
	130	16.5	-	3280	9890	10550	44	1
	24	82.6	-	-	111160	111160	146	5
	25	82.2	-	-	109690	109690	146	5
	30	80.1	-	-	88400	88400	145	4
	35	78.0	-	-	73160	73540	144	3
	40	75.9	-	-	59490	60300	143	3
	50	71.7	-	-	42660	43730	140	2
140	60	67.3	-	-	32690	33770	137	2
feet	70	62.8	-	-	26090	27110	132	2
	80	58.1	-	-	21400	22350	126	1
	90	53.1	-	-	17890	18760	119	1
	100	47.8	-	-	15160	15970	111	1
	110	41.9	-	-	12970	13730	101	1
	120	35.3	-	-	11180	11880	88	1
	130	27.3	-	-	9680	10340	71	1
	140	15.9	-	-	8390	9010	45	1

With 59H Tubular Hammerhead Boom

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	25	82.7	-	-	96520	96520	156	4
	30	80.8	-	-	88110	88110	156	4
	35	78.8	-	-	73020	73360	155	3
	40	76.9	-	-	59330	60130	154	3
	50	72.9	-	-	42470	43530	151	2
	60	68.9	-	-	32480	33550	147	2
	70	64.8	-	-	25870	26880	143	2
150	80	60.4	-	-	21170	22110	138	1
feet	90	55.9	-	-	17660	18530	132	1
	100	51.2	-	-	14920	15730	124	1
	110	46.1	-	-	12740	13490	115	1
	120	40.4	-	-	10950	11650	105	1
	130	34.1	-	-	9450	10110	91	1
	140	26.3	-	-	8170	8790	74	1
	150	15.3	-	-	7070	7650	47	1

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	26	82.8	-	-	85260	85260	166	4
	30	81.4	-	-	85260	85260	166	4
	35	79.6	-	-	72930	73110	165	3
	40	77.7	-	-	59210	59990	164	3
	50	74.0	-	-	42310	43360	161	2
	60	70.3	-	-	32300	33360	158	2
	70	66.4	-	-	25680	26680	154	2
160	80	62.5	-	-	20970	21900	149	1
feet	90	58.3	-	-	17450	18310	144	1
	100	54.0	-	-	14710	15510	137	1
	110	49.4	-	-	12520	13270	129	1
	120	44.5	-	-	10730	11430	119	1
	130	39.1	-	-	9230	9890	108	1
	140	32.9	-	-	7960	8580	94	1
	150	25.5	-	-	6870	7440	76	1
	160	14.8	-	-	5900	6450	48	1

With 59H Tubular Tapered Tip Boom and "K-F-L-M" Counterweight (34,000 lbs.)

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	14	80.5	-	81560	153940	153940	66	6
	15	79.6	-	78850	153940	153940	66	6
	20	74.7	-	67510	143150	143150	65	6
60	25	69.6	31740	51150	112350	112350	63	5
feet	30	64.5	26500	40930	91250	91250	61	4
	35	59.0	22590	33940	74650	75210	58	3
	40	53.3	19580	28860	61240	62200	55	3
	50	40.1	15210	21960	44720	45890	45	2
	60	21.4	12180	17480	34910	36060	29	2
	16	80.2	-	75780	153940	153940	76	6
	20	76.9	-	67010	143150	143150	75	6
	25	72.6	31390	50960	112090	112090	74	5
70	30	68.3	26150	40730	90990	90990	72	4
feet	35	63.8	22260	33740	74570	75110	70	3
	40	59.2	19260	28660	61140	62080	67	3
	50	49.1	14900	21760	44590	45750	60	2
	60	37.0	11900	17290	34780	35920	49	2
	70	19.8	9680	14140	28270	29340	30	2
	17	80.7	-	72850	153940	153940	86	6
	20	78.6	38410	66490	143150	143150	85	6
	25	74.9	31000	50740	111810	111810	84	5
	30	71.1	25780	40510	90710	90710	82	4
80	35	67.3	21900	33510	74460	74980	81	3
feet	40	63.4	18910	28430	61010	61930	78	3
	50	55.0	14570	21540	44440	45590	72	2
	60	45.7	11580	17070	34610	35750	64	2
	70	34.6	9380	13930	28100	29170	52	2
	80	18.5	7680	11590	23460	24440	32	1
	19	80.5	39870	67970	150730	150730	96	6
	20	79.8	38000	65970	143150	143150	95	6
	25	76.6	30610	50500	111510	111510	94	5
	30	73.3	25400	40270	90400	90400	93	4
90	35	69.9	21530	33270	74330	74830	91	3
feet	40	66.5	18540	28190	60860	61770	89	3
	50	59.4	14220	21300	44260	45400	84	2
	60	51.6	11240	16830	34430	35550	77	2
	70	43.0	9060	13690	27910	28970	68	2
	80	32.5	7380	11360	23270	24250	55	1
	90	17.4	6040	9550	19790	20690	34	1
	20	80.9	37640	65510	143150	143150	106	6
	25	78.0	30260	50290	111240	111240	105	5
	30	75.0	25060	40050	90130	90130	103	4
100	35	72.0	21200	33050	74210	74690	102	3
feet	40	69.0	18220	27970	60720	61610	100	3
	50	62.7	13900	21070	44100	45230	96	2
	60	56.0	10930	16610	34250	35370	90	2
	70	48.8	8760	13470	27740	28790	82	2

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
100	80	40.6	7090	11150	23090	24070	72	1
feet	90	30.8	5770	9350	19620	20520	58	1
cont.	100	16.5	4680	7910	16900	17740	35	1
	22	80.6	33930	58850	128780	128780	115	6
	25	79.1	29850	50050	110920	110920	115	5
	30	76.4	24660	39800	89810	89810	114	4
	35	73.7	20810	32800	74060	74520	112	3
	40	71.0	17840	27710	60550	61430	111	3
110	50	65.4	13540	20820	43910	45020	107	2
feet	60	59.5	10580	16350	34050	35160	102	2
	70	53.2	8410	13220	27520	28570	95	2
	80	46.4	6750	10900	22880	23850	86	1
	90	38.7	5440	9100	19400	20300	76	1
	100	29.4	4360	7670	16700	17520	61	1
	110	15.7	3460	6500	14520	15290	37	1
	23	81.0	32050	55370	121920	121920	125	5
	25	80.0	29440	49790	110590	110590	125	5
	30	77.5	24260	39540	89480	89480	124	4
	35	75.1	20410	32540	73910	74350	123	3
	40	72.6	17450	27450	60380	61240	121	3
120	50	67.5	13160	20550	43710	44810	118	2
feet	60	62.2	10210	16080	33840	34940	113	2
	70	56.7	8050	12950	27300	28340	107	2
	80	50.8	6400	10630	22650	23610	100	1
	90	44.3	5090	8840	19170	20060	91	1
	100	37.0	4030	7420	16470	17290	79	1
	110	28.1	3140	6250	14300	15070	63	1
	120	15.1	2380	5270	12520	13230	38	1
	25	80.8	29020	49540	110270	110270	135	5
	30	78.5	23850	39280	89150	89150	134	4
	35	76.3	20020	32270	73750	74170	133	3
	40	74.0	17060	27180	60200	61040	132	3
	50	69.3	12780	20280	43500	44600	128	2
130	60	64.5	9840	15810	33620	34710	124	2
feet	70	59.6	7680	12680	27070	28100	119	2
	80	54.3	6040	10360	22420	23370	112	1
	90	48.7	4740	8580	18940	19820	104	1
	100	42.5	3680	7150	16230	17050	95	1
	110	35.5	2800	5990	14070	14830	82	1
	120	27.0	2060	5020	12290	13000	66	1
	130	14.5	1410	4190	10800	11460	39	1
	27	80.6	-	-	100480	100480	145	4
	30	79.3	-	-	88850	88850	144	4
	35	77.3	-	-	73600	74000	143	3
140	40	75.2	-	-	60020	60850	142	3
feet	50	70.9	-	-	43310	44390	139	2
	60	66.5	-	-	33410	34490	135	2
	70	61.9	-	-	26860	27880	130	2
	80	57.2	-	-	22200	23150	124	1

With 59H Tubular Tapered Tip Boom

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	90	52.2	-	-	18710	19590	117	1
140	100	46.8	-	-	16010	16820	109	1
feet	110	40.9	-	-	13840	14600	98	1
Cont.	120	34.1	-	-	12070	12770	85	1
	130	26.0	-	-	10590	11250	68	1
	140	13.9	-	-	9320	9940	41	1
	28	80.8	-	-	89020	89020	155	4
	30	80.1	-	-	88510	88510	155	4
	35	78.1	-	-	73440	73820	154	3
	40	76.2	-	-	59840	60660	152	3
	50	72.2	-	-	43100	44170	150	2
	60	68.1	-	-	33180	34260	146	2
150	70	63.9	-	-	26620	27640	142	2
feet	80	59.6	-	-	21960	22900	136	1
	90	55.1	-	-	18470	19350	130	1
	100	50.3	-	-	15760	16570	122	1
	110	45.1	-	-	13600	14350	113	1
	120	39.4	-	-	11820	12530	102	1
	130	32.9	-	-	10340	11000	88	1
	140	25.1	-	-	9090	9700	70	1
	150	13.5	-	-	8000	8580	42	1
	30	80.7	-	-	78570	78570	165	4
	35	78.9	-	-	73270	73540	164	3
	40	77.0	-	-	59650	60450	163	3
	50	73.3	-	-	42890	43950	160	2
	60	69.6	-	-	32960	34020	157	2
	70	65.7	-	-	26390	27400	153	2
160	80	61.7	-	-	21720	22650	148	1
feet	90	57.5	-	-	18220	19090	142	1
	100	53.2	-	-	15510	16320	135	1
	110	48.6	-	-	13350	14090	127	1
	120	43.6	-	-	11570	12270	117	1
	130	38.1	-	-	10090	10750	106	1
	140	31.9	-	-	8840	9450	91	1
	150	24.3	-	-	7760	8330	73	1
	160	13.0	-	-	6810	7360	43	1
	31	80.9	-	-	68460	68460	175	3
	35	79.5	-	-	68240	68240	174	3
	40	77.8	-	-	59470	60250	173	3
	50	74.3	-	-	42670	43720	170	2
	60	70.8	-	-	32730	33780	167	2
	70	67.2	-	-	26150	27150	163	2
	80	63.5	-	-	21470	22400	159	1
170	90	59.7	-	-	17970	18840	153	1
feet	100	55.7	-	-	15260	16060	147	1
	110	51.5	-	-	13090	13840	140	1
	120	47.0	-	-	11320	12010	131	1
	130	42.2	-	-	9840	10490	121	1
	140	36.9	-	-	8580	9190	109	1
	150	30.9	-	-	7500	8080	94	1
	160	23.5	-	-	6560	7110	75	1
	170	12.6	-	-	5730	6250	44	1
	33	80.8	-	-	60840	60840	184	3
	35	80.1	-	-	60840	60840	184	3
	40	78.5	-	-	59280	60050	183	3
	50	75.2	-	-	42460	43500	181	2
	60	71.9	-	-	32500	33550	178	2
	70	68.5	-	-	25920	26910	174	2
	80	65.1	-	-	21230	22160	170	1
180	90	61.5	-	-	17730	18590	165	1
feet	100	57.8	-	-	15020	15810	159	1
	110	54.0	-	-	12850	13590	152	1
	120	49.9	-	-	11070	11760	145	1
	130	45.6	-	-	9590	10240	135	1
	140	41.0	-	-	8340	8940	125	1
	150	35.9	-	-	7260	7830	112	1
	160	30.0	-	-	6320	6860	97	1
	170	22.8	-	-	5500	6010	77	1
	180	12.3	-	-	4760	5250	45	1
190	34	81.0	-	-	54490	54490	194	3
feet	35	80.6	-	-	54490	54490	194	3
	40	79.1	-	-	53870	53870	193	3

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Free		Outriggers Set		Ft. From Boom Pt. to Ground	Min. Load Line
			Over Side	Over Rear	Over Side	Over Rear		
	50	76.0	-	-	42250	43280	191	2
	60	72.9	-	-	32270	33320	188	2
	70	69.7	-	-	25680	26670	185	2
	80	66.5	-	-	20990	21910	181	1
	90	63.1	-	-	17480	18340	176	1
190	100	59.7	-	-	14760	15560	171	1
feet	110	56.1	-	-	12590	13330	165	1
cont.	120	52.4	-	-	10810	11500	157	1
	130	48.5	-	-	9330	9970	149	1
	140	44.3	-	-	8080	8680	140	1
	150	39.8	-	-	7000	7570	129	1
	160	34.9	-	-	6060	6600	115	1
	170	29.2	-	-	5240	5750	99	1
	180	22.2	-	-	4510	5000	79	1
	190	12.0	-	-	3860	4320	46	1
	36	80.8	-	-	47450	47450	204	2
	40	79.7	-	-	47120	47120	204	2
	50	76.7	-	-	42030	43050	201	2
	60	73.8	-	-	32040	33080	199	2
	70	70.8	-	-	25430	26420	196	2
	80	67.7	-	-	20740	21650	192	1
	90	64.6	-	-	17230	18080	187	1
	100	61.4	-	-	14500	15290	182	1
200	110	58.0	-	-	12330	13060	176	1
feet	120	54.6	-	-	10550	11230	170	1
	130	51.0	-	-	9070	9710	162	1
	140	47.2	-	-	7810	8410	154	1
	150	43.2	-	-	6730	7300	144	1
	160	38.8	-	-	5800	6340	132	1
	170	34.0	-	-	4980	5490	119	1
	180	28.4	-	-	4250	4740	102	1
	190	21.7	-	-	3600	4060	81	1
	200	11.7	-	-	3010	3450	47	1
	37	81.0	-	-	42760	42760	214	2
	40	80.2	-	-	42480	42480	214	2
	50	77.4	-	-	41130	41130	212	2
	60	74.6	-	-	31810	32830	209	2
	70	71.7	-	-	25190	26170	206	2
	80	68.8	-	-	20490	21400	203	1
	90	65.9	-	-	16970	17820	198	1
	100	62.8	-	-	14250	15030	194	1
*210	110	59.7	-	-	12070	12800	188	1
feet	120	56.5	-	-	10290	10970	182	1
	130	53.2	-	-	8800	9440	175	1
	140	49.7	-	-	7540	8140	167	1
	150	46.0	-	-	6470	7030	158	1
	160	42.1	-	-	5530	6070	147	1
	170	37.8	-	-	4710	5220	136	1
	180	33.1	-	-	3990	4470	122	1
	190	27.7	-	-	3340	3800	104	1
	200	21.1	-	-	2760	3190	82	1
	210	11.4	-	-	2220	2640	48	1
	39	80.9	-	-	38590	38590	224	2
	40	80.6	-	-	38480	38480	224	2
	50	78.0	-	-	36640	36640	222	2
	60	75.3	-	-	31570	32590	220	2
	70	72.6	-	-	24940	25910	217	2
	80	69.8	-	-	20240	21140	213	1
	90	67.0	-	-	16720	17560	209	1
	100	64.2	-	-	13980	14760	205	1
	110	61.2	-	-	11800	12530	200	1
*220	120	58.2	-	-	10020	10700	194	1
feet	130	55.1	-	-	8530	9170	187	1
	140	51.9	-	-	7280	7870	180	1
	150	48.5	-	-	6200	6760	171	1
	160	44.9	-	-	5260	5790	162	1
	170	41.1	-	-	4440	4950	151	1
	180	36.9	-	-	3720	4200	139	1
	190	32.3	-	-	3070	3530	124	1
	200	27.1	-	-	2490	2930	107	1
	210	20.6	-	-	1960	2380	84	1
	220	11.1	-	-	1480	1880	49	1

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
40' JIB & 100' BOOM	30	80.9					
	35	78.8					
	40	76.7	19,000 *	79.4	19,000 *		
	50	72.4	19,000 *	75.1	19,000 *	77.7	19,000 *
	60	68.1	19,000 *	70.8	19,000 *	73.2	19,000 *
	70	63.6	19,000 *	66.2	19,000 *	68.6	18,790 *
	80	58.9	19,000 *	61.5	19,000 *	63.8	17,880 *
	90	53.9	19,000 *	56.5	18,690 *	58.7	16,720 *
	100	48.6	17,220	51.1	17,220	53.2	15,770 *
40' JIB & 110' BOOM	32	80.7	19,000 *		*		
	35	79.5	19,000 *		*		
	40	77.6	19,000 *	80.1	19,000 *		
	50	73.6	19,000 *	76.2	19,000 *	78.5	19,000 *
	60	69.6	19,000 *	72.1	19,000 *	74.4	19,000 *
	70	65.5	19,000 *	67.9	19,000 *	70.2	18,920 *
	80	61.2	19,000 *	63.6	19,000 *	65.8	18,450 *
	90	56.7	19,000 *	59.1	18,860 *	61.2	17,290 *
	100	51.9	16,920	54.3	16,930	56.3	16,260 *
	110	46.8	14,780	49.1	14,780	51.0	14,780
40' JIB & 120' BOOM	33	80.9	19,000 *				
	35	80.2	19,000 *				
	40	78.4	19,000 *	80.8	19,000 *		
	50	74.7	19,000 *	77.1	19,000 *	79.3	19,000 *
	60	70.9	19,000 *	73.3	19,000 *	75.5	19,000 *
	70	67.1	19,000 *	69.4	19,000 *	71.6	19,000 *
	80	63.1	19,000 *	65.4	19,000 *	67.5	18,690 *
	90	59.0	19,000 *	61.3	18950 *	63.3	17,780 *
	100	54.7	16,640	56.9	16,640	58.9	16,640
	110	50.2	14,490	52.3	14,490	54.2	14,490
	120	45.3	12,740	47.4	12,740	49.1	12,750
40' JIB & 130' BOOM	35	80.8	19,000 *				
	40	79.1	19,000 *				
	50	75.6	19,000 *	77.8	19,000 *	79.9	19,000 *
	60	72.1	19,000 *	74.3	19,000 *	76.4	19,000 *
	70	68.5	19,000 *	70.7	19,000 *	72.7	19,000 *
	80	64.8	19,000 *	67.0	19,000 *	69.0	18,800 *
	90	61.0	18,630	63.2	18,630	65.1	18,180 *
	100	57.1	16,340	59.2	16,340	61.0	16,340
	110	52.9	14,190	55.0	14,190	56.8	14,190
	120	48.5	12,430	50.6	12,430	52.3	12,440
	130	43.8	10,970	45.8	10,980	47.4	10,980
40' JIB & 140' BOOM	36	81.0	19,000 *				
	40	79.7	19,000 *				
	50	76.4	19,000 *	78.5	19,000 *	80.5	19,000 *
	60	73.1	19,000 *	75.2	19,000 *	77.2	19,000 *
	70	69.8	19,000 *	71.8	19,000 *	73.8	19,000 *
	80	66.3	19,000 *	68.4	19,000 *	70.3	18,830

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
40' JIB & 140' BOOM	90	62.8	18,770	64.8	18770	66.6	18,630 *
	100	59.1	16,070	61.1	16070	62.9	16,080
	110	55.3	13,920	57.3	13,920	59.0	13,930
	120	51.3	12,160	53.3	12,160	54.9	12,170
	130	47.1	10,700	49.0	10,710	50.5	10,710
	140	42.5	9,470	44.3	9,470	45.8	9,480
40' JIB & 150' BOOM	38	80.8	19,000 *				
	40	80.2	19,000 *				
	50	77.2	19,000 *	79.2	19,000 *		
	6	74.0	19,000 *	76.0	19,000 *	77.9	19,000 *
	70	70.9	19,000 *	72.9	19,000 *	74.7	19,000 *
	80	67.7	19,000 *	69.6	19,000 *	71.4	18,910 *
	90	64.3	18,480	66.3	18,480	68.0	18,480
	100	60.9	15,770	62.8	15,780	64.5	15,780
	110	57.4	13,620	59.3	13,630	60.9	13,630
	120	53.7	11,860	55.6	11,870	57.2	11,870
	130	49.8	10,400	51.7	10,400	53.2	10,400
	140	45.7	9,170	47.5	9,170	48.9	9,170
	150	41.3	8,110	43.0	8,120	44.4	8,120
40' JIB & 160' BOOM	40	80.7	19,000 *				
	50	77.8	19,000 *	79.7	19,000 *		
	60	74.9	19,000 *	76.8	19,000 *	78.5	19,000 *
	70	71.9	19,000 *	73.7	19,000 *	75.5	19,000 *
	80	68.8	19,000 *	70.7	19,000 *	72.4	18,970 *
	90	65.7	18,200	67.6	18,200	69.2	18,210
	100	62.5	15,490	64.3	15,490	66.0	15,490
	110	59.2	13,340	61.0	13,340	62.6	13,340
	120	55.8	11,580	57.6	11,580	59.1	11,580
	130	52.2	10,110	54.0	10,110	55.5	10,110
	140	48.5	8,870	50.2	8,870	51.6	8,870
	150	44.5	7,810	46.2	7,820	47.5	7,820
	160	40.2	6,900	41.8	6,900	43.0	6,910
40' JIB & 170' BOOM	41	80.9	19,000 *				
	50	78.4	19,000 *	80.2	19,000 *		
	60	75.6	19,000 *	77.4	19,000 *	79.1	19,000 *
	70	72.8	19,000 *	74.6	19,000 *	76.2	19,000 *
	80	69.9	19,000 *	71.7	19,000 *	73.3	18,670 *
	90	66.9	17,910	68.7	17,910	70.3	17,910
	100	63.9	15,190	65.7	15,190	67.2	15,200
	110	60.8	13,040	62.6	13,040	694.1	13,050
	120	57.7	11,270	59.4	11,270	60.8	11,270
	130	54.3	9,810	56.0	9,810	57.5	9,810
	140	50.9	8,570	52.5	8,570	50.9	8,580
	150	47.2	7,510	48.9	7,510	50.2	7,520
	160	43.4	6,600	44.9	6,600	46.2	6,600
	170	39.2	5,790	40.7	5,800	41.8	5,800

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
40' JIB & 180' BOOM	43	80.8	19,000 *				
	50	78.9	19,000 *	80.7	19,000 *		
	60	76.3	19,000 *	78	19,000 *	79.6	17,210 *
	70	73.6	19,000 *	75.3	19,000 *	76.9	16,720 *
	80	70.8	19,000 *	72.5	19,000 *	74.1	16,190 *
	90	68.0	17,630	69.7	17,630	71.3	15,540 *
	100	65.2	14,920	66.9	14,920	68.4	14,910 *
	110	62.3	12,750	63.9	12,760	65.4	12,760
	120	59.3	10,990	60.9	10,990	62.4	11,000
	130	56.2	9,520	57.8	9,520	59.2	9,530
	140	53.0	8,280	54.6	8,280	55.9	8,290
	150	49.6	7,220	51.2	7,230	52.5	7,230
	160	46.1	6,310	47.6	6,310	48.8	6,310
	170	42.3	5,510	43.8	5,510	44.9	5,520
	180	38.2	4,810	39.7	4,810	40.7	4,820
40' JIB & 190' BOOM	44	80.9	19,000 *				
	50	79.4	19,000 *				
	60	76.9	19,000 *	78.5	18,070 *	80.1	14,950 *
	70	74.3	18,930 *	75.9	17,330 *	77.5	14,500 *
	80	71.7	17,890 *	73.3	16,520 *	74.8	13,900 *
	90	69.1	16,930 *	70.7	15,680 *	72.1	13,320 *
	100	66.4	14,630	68.0	14,630	69.4	12,660 *
	110	63.6	12,460	65.2	12,460	66.6	12,020 *
	120	60.8	10,700	62.3	10,700	63.7	10,700
	130	57.9	9,220	59.4	9,230	60.8	9,230
	140	54.9	7,980	56.4	7,990	57.7	7,990
	150	51.7	6,930	53.2	6,930	54.5	6,930
	160	48.5	6,010	49.9	6,010	51.1	6,010
	170	45.0	5,200	46.5	5,200	47.6	5,210
	180	41.3	4,500	42.7	4,500	43.8	4,500
	190	37.3	3,870	38.7	3,880	39.7	3,880
40' JIB & 200' BOOM	46	80.8	18,730 *				
	50	79.9	18,340 *				
	60	77.4	17,310 *	79.0	15,720 *	80.5	13,020 *
	70	75.0	16,380 *	76.5	14,990 *	78.0	12,530 *
	80	72.5	15,410 *	74.0	14,190 *	75.5	11,930 *
	90	70.0	11,490 *	71.5	13,470 *	72.9	11,320 *
	100	67.4	13,620 *	68.9	12,680 *	70.3	10,700 *
	110	64.8	12,170	66.3	11,930 *	67.7	10,080 *
	120	62.1	10,400	63.6	10,400	64.9	9,460 *
	130	59.4	8,930	60.9	8,930	62.2	8,870 *
	140	56.5	7,690	58.0	7,690	59.3	7,690
	150	53.6	6,630	55.1	6,630	56.3	6,630
	160	50.5	5,710	52.0	5,710	53.2	55,710
	170	47.4	4,910	48.8	4,910	49.9	4,920
	180	44.0	4,210	45.4	4,210	46.4	4,210
	190	40.4	3,580	41.7	3,580	42.7	3,590
	200	36.5	3,020	37.8	3,020	38.7	3,030

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
40' JIB & 210' BOOM	47	81.0	16,280 *				
	50	80.3	16,010 *				
	60	77.9	15,040 *	79.5	13,660 *	80.9	11,320 *
	70	75.6	14,110 *	77.1	12,950 *	78.5	10,780 *
	80	73.2	13,180 *	74.7	12,190 *	76.1	10,180 *
	90	70.8	12,320 *	72.3	11,430 *	73.7	9,580 *
	100	68.3	11,460 *	69.8	10,200 *	71.2	8,950 *
	110	65.9	10,700 *	67.3	9,990 *	68.6	8,350 *
	120	63.3	9,920 *	64.8	9,300 *	66.1	7,770 *
	130	60.7	8,630	62.2	8,630	63.4	7,200 *
	140	58.0	7,390	59.5	7,390	60.7	6,640 *
	150	55.3	6,320	56.7	6,320	57.9	6,110 *
	160	52.4	5,400	53.8	5,400	55.0	5,410
	170	49.5	4,600	50.8	4,600	51.9	4,610
	180	46.3	3,900	47.7	3,900	48.8	3,900
	190	43.0	3,270	44.4	3,270	45.4	3,280
	200	39.5	2,710	40.8	2,710	41.8	2,710
	210	35.7	2,220	37.0	2,220	37.8	2,220
40' JIB & 220' BOOM	49	80.9	14,050 *				
	50	80.6	13,970 *				
	60	78.4	13,030 *	79.9	11,860 *		
	70	76.2	12,060 *	77.6	11,120 *	79.0	9,220 *
	80	73.9	11,220 *	75.3	10,360 *	76.7	8,600 *
	90	71.6	10,370 *	73.0	9,640 *	74.3	8,010
	100	69.2	9,590 *	70.6	8,930 *	71.9	7,400 *
	110	66.8	8,850 *	68.3	8,260 *	69.5	6,820 *
	120	64.4	8,130 *	65.8	7,620 *	67.1	6,250 *
	130	61.9	7,470 *	63.3	7,010 *	64.6	5,700 *
	140	59.4	6,840 *	60.8	6,410 *	62.0	5,190 *
	150	56.8	6,020	58.2	5,840 *	59.3	4,680 *
	160	54.1	5,100	55.5	5,100	56.6	4,170 *
	170	51.3	4,300	52.7	4,310	53.8	3,690 *
	180	48.4	3,600	49.7	3,600	50.8	3,200 *
	190	45.4	2,970	46.7	2,970	47.7	2,730 *
	200	42.2	2,400	43.4	2,410	44.4	2,270 *
	210	38.7	1,910	39.9	1,910	40.8	1,790 *
	220	35.0	1,460	36.2	1,460	37.0	1,310 *

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
50' JIB & 130' BOOM	37	80.9	19,000 *				
	40	80.0	19,000 *				
	50	76.7	18,840 *	79.4	17,270 *		
	60	73.4	18,200 *	76.0	16,820 *	78.5	15,630 *
	70	70.0	17,630 *	72.7	16,360 *	75.1	15,330 *
	80	66.6	17,050 *	69.2	15,930 *	71.6	15,010 *
	90	63.1	16,530 *	65.6	15,570 *	67.9	14,650 *
	100	59.4	16,060 *	61.9	15,100 *	64.2	14,280 *
	110	55.6	14,300	58.1	14,300	60.3	13,740 *
	120	51.6	12,540	54.0	12,540	56.2	12,550
	130	47.3	11,080	49.7	11,090	51.8	11,090
50' JIB & 140' BOOM	39	80.8	19,000 *				
	40	80.5	19,000 *				
	50	77.4	18,900 *	79.9	17,210		
	60	74.3	18,270 *	76.8	16,810	79.1	15,560 *
	70	71.1	17,690 *	73.6	16,410	75.9	15,330 *
	80	67.9	17,180 *	70.4	15,990	72.6	15,050 *
	90	64.6	16,700 *	67.0	15,610	69.2	14,740 *
	100	61.2	16,180	63.6	15,310	65.8	14,420 *
	110	57.7	14,020	60.0	14,030	62.4	14,030
	120	54.0	12,260	56.3	12,270	58.3	12,270
	130	50.1	10,810	52.4	10,810	54.4	10,810
	140	46.0	9,570	48.2	9,570	50.1	9,580
50' JIB & 150' BOOM	40	81.0	19,000 *				
	50	78.1	18,820 *	80.4	17,160 *		
	60	75.1	18,280 *	77.5	16,810 *	79.7	15,520 *
	70	72.1	17,770 *	74.5	16,380 *	76.7	15,240 *
	80	69.1	17,280 *	71.4	16,030 *	73.6	15,040 *
	90	66.0	16,760 *	68.3	15,680 *	70.4	14,760 *
	100	62.8	15,890	65.1	15,340 *	67.1	14,520 *
	110	59.5	13,730	61.7	13,730	63.8	13,730
	120	56.1	11,970	58.3	11,970	60.2	11,970
	130	52.5	10,510	54.7	10,510	56.6	10,510
	140	48.7	9,270	50.9	9,270	52.7	9,280
	150	44.7	8,210	46.9	8,220	48.6	8,220
50' JIB & 160' BOOM	42	80.8	19,000 *				
	50	78.6	18,730 *	80.9	17,040 *		
	60	75.8	18,270 *	78.1	16,670 *	80.2	15,340 *
	70	73.0	17,770 *	75.2	16,340 *	77.3	15,180 *
	80	70.1	17,310 *	72.3	16,000 *	74.4	14,970 *
	90	67.2	16,870 *	69.4	15,670 *	71.4	14,710 *
	100	64.2	15,600	66.4	15,350 *	68.3	14,550 *
	110	61.1	13,440	63.2	13,440	65.2	13,450
	120	57.9	11,680	60.0	11,680	61.9	11,680
	130	54.6	10,220	56.7	10,220	58.5	10,230
	140	51.1	8,980	5..2	8,980	55.0	8,990
	150	47.5	7,920	49.5	7,930	51.2	7,930
	160	43.6	7,010	45.6	7,010	47.2	7,010

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
50' JIB & 170' BOOM	44	80.7	18,800 *				
	50	79.2	18,510 *				
	60	76.5	18,110 *	78.7	16,530 *	80.7	15,100 *
	70	73.8	17,690 *	75.9	16,250 *	77.9	14,980 *
	80	71.1	17,240 *	73.2	15,950 *	75.2	14,810 *
	90	68.3	16,810 *	70.4	15,650 *	72.3	14,590 *
	100	65.4	15,310	67.5	15,310	69.4	14,380 *
	110	62.5	13,140	64.6	13,150	66.5	13,150
	120	59.5	11,380	61.7	11,380	63.4	11,390
	130	56.4	9,910	58.5	9,910	60.2	9,920
	140	53.2	8,670	55.2	8,670	56.9	8,680
	150	49.8	7,610	51.8	7,620	53.5	7,620
	160	46.3	6,700	48.2	6,700	49.8	6,700
	170	42.5	5,900	44.4	5,900	45.9	5,910
50' JIB & 180' BOOM	45	80.9	18,450 *				
	50	79.6	18,250 *				
	60	77.1	17,890 *	79.2	16,280 *		
	70	74.5	17,450 *	76.6	16,040 *	78.5	14,670 *
	80	71.9	17,060 *	74.0	15,780 *	75.8	14,480 *
	90	69.3	16,690 *	71.3	15,460 *	73.2	14,310 *
	100	66.6	15,030	68.6	15,030	70.4	13,890 *
	110	63.8	12,870	65.8	12,870	67.6	12,870
	120	61.0	11,100	63.0	11,100	64.7	11,100
	130	58.1	9,630	60.0	9,640	61.7	9,640
	140	55.1	8,390	57.0	8,400	58.7	8,400
	150	51.9	7,340	53.8	7,340	55.5	7,340
	160	48.7	6,420	50.5	6,420	52.1	6,420
	170	45.2	5,610	47.0	5,610	48.5	5,620
	180	41.5	4,920	43.3	4,920	44.7	4,920
50' JIB & 190' BOOM	47	80.8	17,910 *				
	50	80.1	17,830 *				
	60	77.6	17,450 *	79.6	15,890 *		
	70	75.2	17,130 *	77.2	15,690 *	79.0	13,280 *
	80	72.7	16,720 *	74.7	15,410 *	76.5	12,890 *
	90	70.2	16,270 *	72.1	14,860 *	73.9	12,390 *
	100	67.6	14,740	69.5	14,150 *	71.3	11,820 *
	110	65.0	12,570	66.9	12,570	68.6	11,290 *
	120	62.3	10,800	64.2	10,800	65.9	10,730 *
	130	59.6	9,340	61.4	9,340	63.1	9,340
	140	56.7	8,090	58.6	8,090	60.2	8,090
	150	53.8	7,030	55.6	7,030	57.2	7,030
	160	50.8	6,110	52.6	6,110	54.1	6,120
	170	47.6	5,310	49.3	5,310	50.8	5,320
	180	44.2	4,610	45.9	4,610	47.3	4,610
	190	40.6	3,980	42.3	3,980	43.6	3,990

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
50' JIB & 200' BOOM	48	80.9	17,290 *				
	50	80.5	17,180 *				
	60	78.1	16,600 *	80.0	14,750 *		
	70	75.8	15,660 *	77.7	14,080 *	79.5	11,540 *
	80	73.4	14,790 *	75.3	13,430 *	77.0	11,080 *
	90	71.0	13,930 *	72.9	12,770 *	74.6	10,560 *
	100	68.5	13,070 *	70.4	12,060 *	72.1	10,050 *
	110	66.1	12,290	67.9	11,380 *	69.6	9,500 *
	120	63.5	10,510	65.3	10,520	67.0	8,960 *
	130	60.9	9,040	62.7	9,040	64.3	8,430 *
	140	58.2	7,800	60.0	7,800	61.6	7,810
	150	55.5	6,730	57.2	6,730	58.8	6,740
	160	52.6	5,810	54.4	5,810	55.9	5,820
	170	49.6	5,010	51.4	5,010	52.8	5,020
	180	46.5	4,310	48.2	4,310	49.6	4,310
	190	43.2	3,680	44.9	3,680	46.2	3,690
	200	39.7	3,130	41.3	3,130	42.6	3,130
50' JIB & 210' BOOM	50	80.8	15,360 *				
	60	78.6	14,420 *	80.4	12,860 *		
	70	76.3	13,530 *	78.2	12,200 *	79.9	9,960 *
	80	74.1	12,670 *	75.9	11,540 *	77.6	9,490 *
	90	71.8	11,820 *	73.6	10,880 *	75.2	8,990 *
	100	69.4	11,050 *	71.2	10,190 *	72.8	8,470 *
	110	67.0	10,290 *	68.8	9,560 *	70.4	7,920 *
	120	64.6	9,600 *	66.4	8,950 *	68.0	7,400 *
	130	62.1	8,740	63.9	8,320 *	65.4	6,880 *
	140	59.6	7,490	61.3	7,500	62.8	6,380 *
	150	57.0	6,430	58.7	6,430	60.2	5,870 *
	160	54.3	5,510	56.0	5,510	57.4	5,380 *
	170	51.5	4,700	53.2	4,710	54.6	4,710
	180	48.6	4,000	50.3	4,000	51.6	4,000
	190	45.6	3,370	47.2	3,370	48.5	3,380
	200	42.3	2,810	43.9	2,820	45.2	2,820
	210	38.9	2,310	40.5	2,310	41.6	2,320
50' JIB & 220' BOOM	51	81.0	13,320 *				
	60	79.0	12,500 *	80.8	11,220 *		
	70	76.9	11,640 *	78.6	10,550 *	80.3	8,580 *
	80	74.7	10,780 *	76.4	9,880 *	78.0	8,090 *
	90	72.5	9,990 *	74.2	9,200 *	75.8	7,570 *
	100	70.2	9,260 *	71.9	8,580 *	73.5	7,020 *
	110	67.9	8,550 *	69.6	7,940 *	71.2	6,510 *
	120	65.6	7,880 *	67.3	7,360 *	68.9	6,000 *
	130	63.3	7,260 *	64.9	6,760 *	66.4	5,490 *
	140	60.8	6,660 *	62.5	6,220 *	64.0	5,000 *
	150	58.4	6,070 *	60.0	5,700 *	61.5	4,530 *
	160	55.8	5,220	57.5	5,180 *	58.9	4,080 *
	170	53.2	4,420	54.8	4,420	56.2	3,630 *
	180	50.5	3,710	52.1	3,710	53.4	3,200 *
	190	47.6	3,080	49.2	3,080	50.5	2,770 *
	200	44.7	2,520	46.2	2,530	47.4	2,340 *
	210	41.5	2,020	43.0	2,020	44.2	1,910 *
	220	38.1	1,570	39.6	1,570	40.7	1,480 *

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
60' JIB & 150' BOOM	43	80.8	14,670 *				
	50	78.9	14,290 *				
	60	76.1	13,730 *	78.8	12,430 *		
	70	73.2	13,270 *	75.9	12,040 *	78.5	10,920 *
	80	70.4	12,770 *	73.0	11,590 *	75.5	10,580 *
	90	67.4	12,380 *	70.1	11,160 *	72.5	10,270 *
	100	64.4	11,840 *	67.0	10,760 *	69.5	9,960 *
	110	61.3	11,340 *	63.9	10,440 *	66.3	9,700 *
	120	58.1	10,940 *	60.7	10,120 *	63.0	9,490 *
	130	54.8	10,520 *	57.4	9,820 *	59.6	9,320 *
	140	51.3	9,370	53.9	9,370	56.0	9,120
	150	47.7	8,310	50.2	8,320	52.3	8,320
60' JIB & 160' BOOM	44	81.0	14,570 *				
	50	79.4	14,250 *				
	60	76.7	13,790 *	79.3	12,410 *		
	70	74.0	13,320 *	76.6	12,060 *	79.0	11,020 *
	80	71.3	12,850 *	73.9	11,710 *	76.3	10,670 *
	90	68.5	12,470 *	71.0	11,270 *	73.4	10,320 *
	100	65.7	12,050 *	68.2	10,920 *	70.5	10,050 *
	110	62.7	11,580 *	65.2	10,540 *	67.5	9,800 *
	120	59.7	11,140 *	62.2	10,240 *	64.4	9,590 *
	130	56.6	10,310	59.1	9,970 *	61.3	9,390 *
	140	53.4	9,070	55.9	9,070	58.0	9,080
	150	50.1	8,010	52.5	8,020	54.5	8,020
	160	46.5	7,100	48.9	7,100	50.8	7,110
60' JIB & 170' BOOM	46	80.9	14,380 *				
	50	79.8	14,200 *				
	60	77.3	13,780 *	79.8	12,360 *		
	70	74.7	13,360 *	77.2	12,090 *	79.5	11,030 *
	80	72.1	12,920 *	74.6	11,780 *	76.9	10,710 *
	90	69.5	12,490 *	71.9	11,420 *	74.2	10,410 *
	100	66.8	12,140 *	69.2	11,020 *	71.4	10,120 *
	110	64.0	11,780 *	66.4	10,650 *	68.6	9,860 *
	120	61.2	11,300 *	63.6	10,340 *	65.7	9,650 *
	130	58.3	10,010	60.6	10,020	62.7	9,430 *
	140	55.3	8,770	57.6	8,780	59.7	8,780
	150	52.1	7,720	54.5	7,720	56.4	7,720
	160	48.9	6,800	51.1	6,800	53.1	6,810
	170	45.4	6,000	47.6	6,000	49.5	6,010

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

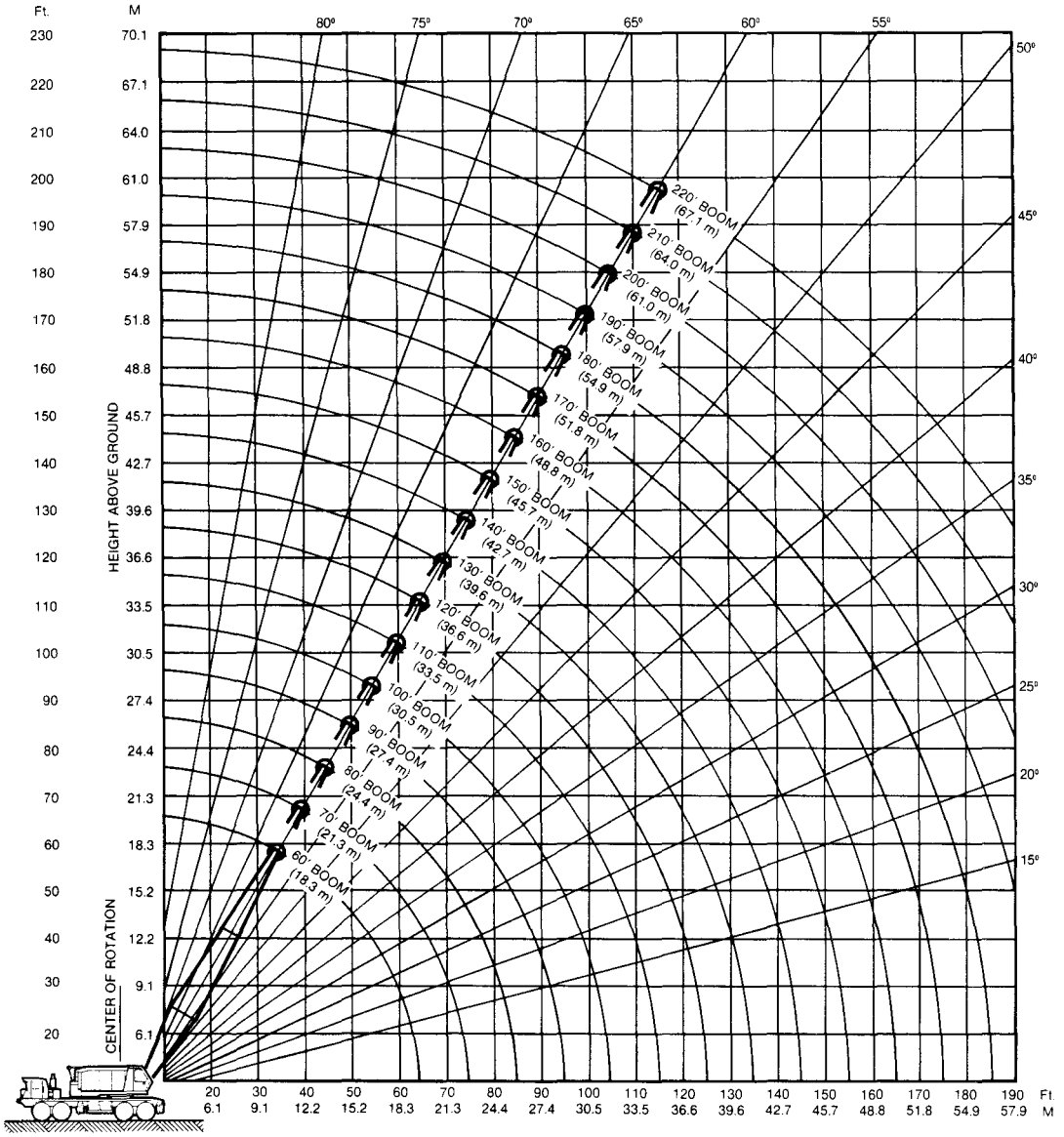
BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
60' JIB & 180' BOOM	47	81.0	14,290 *				
	50	80.3	14,170 *				
	60	77.8	13,720 *	80.2	12,320 *		
	70	75.4	13,340 *	77.8	12,020 *	80.0	10,930 *
	80	72.9	12,940 *	75.3	11,750 *	77.5	10,760 *
	90	70.4	12,520 *	72.7	11,470 *	74.9	10,450 *
	100	67.8	12,180 *	70.1	11,140 *	72.3	10,190 *
	110	65.2	11,830 *	67.5	10,770 *	69.6	9,940 *
	120	62.5	11,200	64.8	10,480 *	66.9	9,700 *
	130	59.8	9,730	62.0	9,730	64.1	9,510 *
	140	56.9	8,490	59.2	8,490	61.2	8,490
	150	54.0	7,430	56.2	7,430	58.1	7,430
	160	51.0	6,510	53.1	6,510	55.0	6,520
	170	47.8	5,710	49.9	5,710	51.7	5,720
	180	44.4	5,010	46.5	5,010	48.2	5,010
60' JIB & 190' BOOM	49	80.9	14,080 *				
	50	80.7	14,020 *				
	60	78.3	13,660 *	80.6	12,200 *		
	70	76.0	13,260 *	78.3	11,950 *	80.4	10,800 *
	80	73.6	12,890 *	75.9	11,680 *	78.0	10,600 *
	90	71.2	12,520 *	73.4	11,410 *	75.5	10,460 *
	100	68.7	12,150 *	71.0	11,180 *	73.0	10,240 *
	110	66.3	11,860 *	68.5	10,890 *	70.5	10,000 *
	120	63.7	10,900	65.9	10,570 *	67.9	9,790 *
	130	61.1	9,430	63.3	9,430	65.2	9,440
	140	58.4	8,190	60.6	8,190	62.5	8,200
	150	55.7	7,130	57.8	7,130	59.7	7,140
	160	52.8	6,210	54.9	6,210	56.7	6,220
	170	49.8	5,400	51.9	5,400	53.7	5,410
	180	46.7	4,710	48.8	4,710	50.5	4,710
	190	43.4	4,080	45.5	4,080	47.1	4,090
60' JIB & 200' BOOM	51	80.8	13,770 *				
	60	78.8	13,440 *				
	70	76.5	13,080 *	78.7	11,780 *	80.8	10,540 *
	80	74.3	12,740 *	76.4	1,152 *	78.5	10,240 *
	90	71.9	12,420 *	74.1	11,300 *	76.1	9,810 *
	100	69.6	12,060 *	71.8	11,070 *	73.7	9,390 *
	110	67.2	11,750 *	69.4	10,790 *	71.3	8,930 *
	120	64.8	10,620	66.9	10,190 *	68.9	8,460 *
	13	62.3	9,140	64.4	9,150	66.3	7,980 *
	140	59.8	7,890	61.9	7,900	63.7	7,490 *
	150	57.2	6,830	59.2	6,830	61.1	6,840
	160	54.5	5,910	56.5	5,910	58.3	5,920
	170	51.7	5,110	53.7	5,120	55.4	5,120
	180	48.8	4,410	50.8	4,410	52.5	4,410
	190	45.7	3,780	47.7	3,780	49.3	3,790
	200	42.5	3,220	44.5	3,230	46.0	3,230

#9HL JIB RATINGS FOR MODEL 7530 TRUCK CRANE
W/59H TAPER TIP-33,700 LBS CTWT

BOOM & JIB LENGTH	JIB RADIUS (FEET)	5 ˚ JIB OFFSET Boom Angle	5 ˚ JIB OFFSET RATINGS (LBS)	15 ˚ JIB OFFSET Boom Angle	15 ˚ JIB OFFSET RATINGS (LBS)	25 ˚ JIB OFFSET Boom Angle	25 ˚ JIB OFFSET RATINGS (LBS)
60' JIB & 210' BOOM	52	80.9	13,410 *				
	60	79.2	13,140 *				
	70	77.0	12,790 *	79.2	11,500 *		
	80	74.8	12,180 *	77.0	10,900 *	78.9	8,800 *
	90	72.6	11,360 *	74.7	10,320 *	76.7	8,360 *
	100	70.4	10,610 *	72.5	9,710 *	74.4	7,920 *
	110	68.1	9,920 *	70.2	9,120 *	72.1	7,460 *
	120	65.8	9,240 *	67.8	8,540 *	69.7	6,990 *
	130	63.4	8,610 *	65.5	7,980 *	67.3	6,520 *
	140	61.0	7,600	63.0	7,430 *	64.8	6,060 *
	150	58.5	6,540	60.5	6,540	62.3	5,630 *
	160	56.0	5,600	58.0	5,610	59.7	5,190 *
	170	53.4	4,810	55.3	4,810	57.0	4,760 *
	180	50.6	4,100	52.6	4,100	54.2	4,100
	190	47.8	3,470	49.7	3,470	51.3	3,480
	200	44.8	2,910	46.7	2,920	48.2	2,920
	210	41.7	2,410	43.5	2,410	45.0	2,420
60' JIB & 220' BOOM	54	80.8	12,520 *				
	60	79.6	12,040 *				
	70	77.5	11,190 *	79.6	9,940 *		
	80	75.4	10,390 *	77.4	9,340 *	79.3	7,510 *
	90	73.3	9,620 *	75.3	8,740 *	77.2	7,070 *
	100	71.1	8,900 *	73.1	8,180 *	75.0	6,610 *
	110	68.9	8,230 *	70.9	7,590 *	72.8	6,150 *
	120	66.7	7,600 *	68.7	7,040 *	70.5	5,700 *
	130	64.5	6,990 *	66.4	6,500 *	68.2	5,250 *
	140	62.2	6,420 *	64.1	5,980 *	65.9	4,800 *
	150	59.8	5,880 *	61.7	5,480 *	63.4	4,370 *
	160	57.4	5,320	59.3	5,020 *	61.0	3,940 *
	170	54.9	4,520	56.8	4,520	58.4	3,540 *
	180	52.3	3,810	54.2	3,810	55.8	3,140 *
	190	49.7	3,180	51.5	3,180	53.1	2,740 *
	200	46.9	2,620	48.7	2,630	50.2	2,350 *
	210	44.0	2,120	45.8	2,120	47.2	1,970 *
	220	40.9	1,660	42.6	1,670	44.0	1,580 *

MODEL 7530 WORKING RANGES

BOOM ANGLE DIAGRAM



5JR829 FORM NO. 7530-TR-7 PRINTED IN U.S.A.

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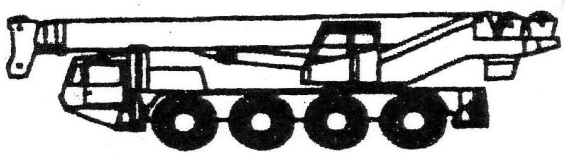
CONSTRUCTION EQUIPMENT GROUP
63 SO. ROBERT ST., ST. PAUL, MN 55107

FORD CRANE
INC.



P.O. Box 2497
Snohomish, WA 98291

GROVE

TRUCK CRANE

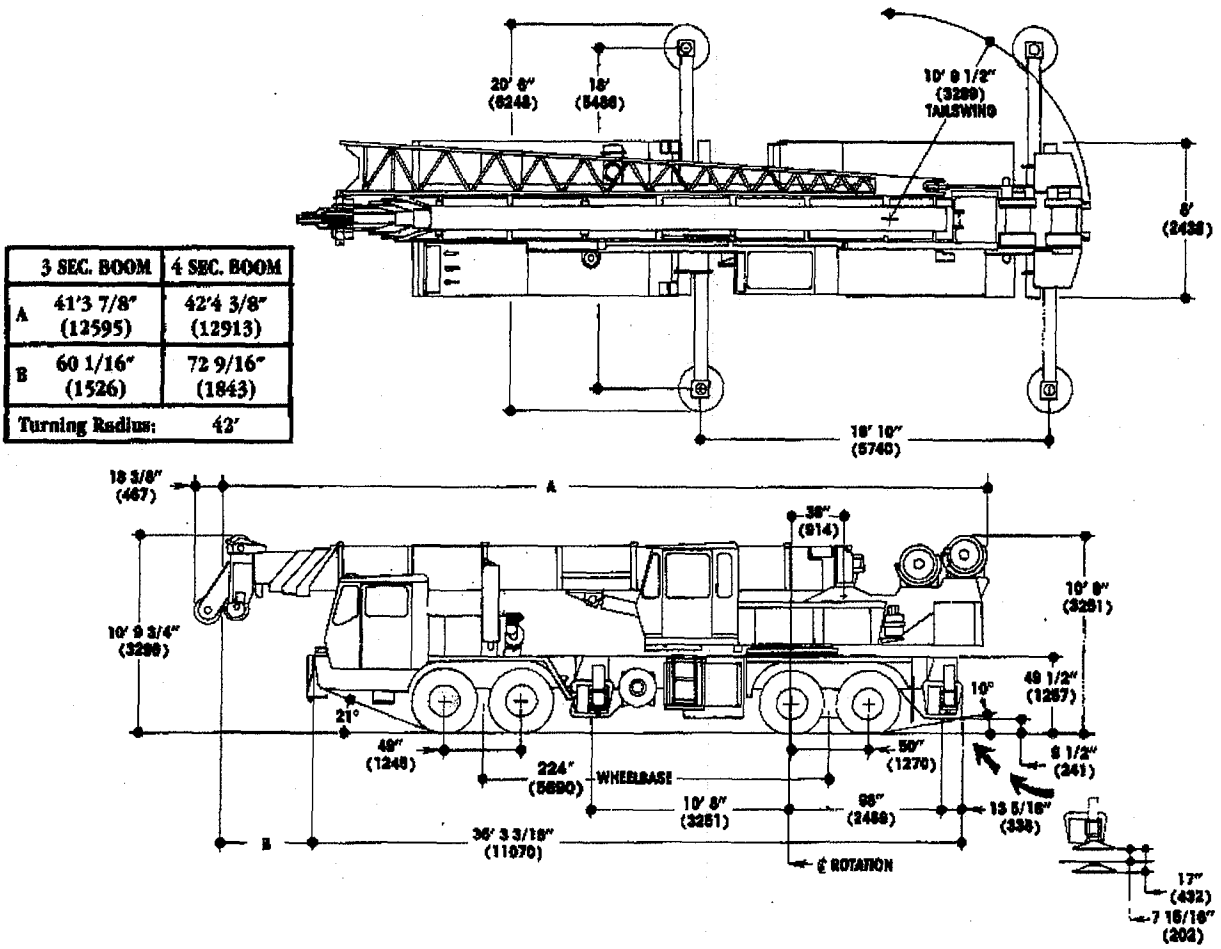
TMS 300B

40 Ton Boom

Dimensions

TMS300B

	3 SEC. BOOM	4 SEC. BOOM
A	41'3 7/8" (12595)	42'4 3/8" (12913)
B	60 1/16" (1526)	72 9/16" (1843)
Turning Radius:		42'



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Phone: (091) 565-6281

Distributed By:

TMS300B

40 TON CAPACITY
34 ft. - 136 ft. BOOM

(POWER PINNED)
85% OF TIPPING
PCSA CLASS 10-114

JIB CAPACITIES IN POUNDS
24 ft. JIB and 32 ft. EXT. Combination

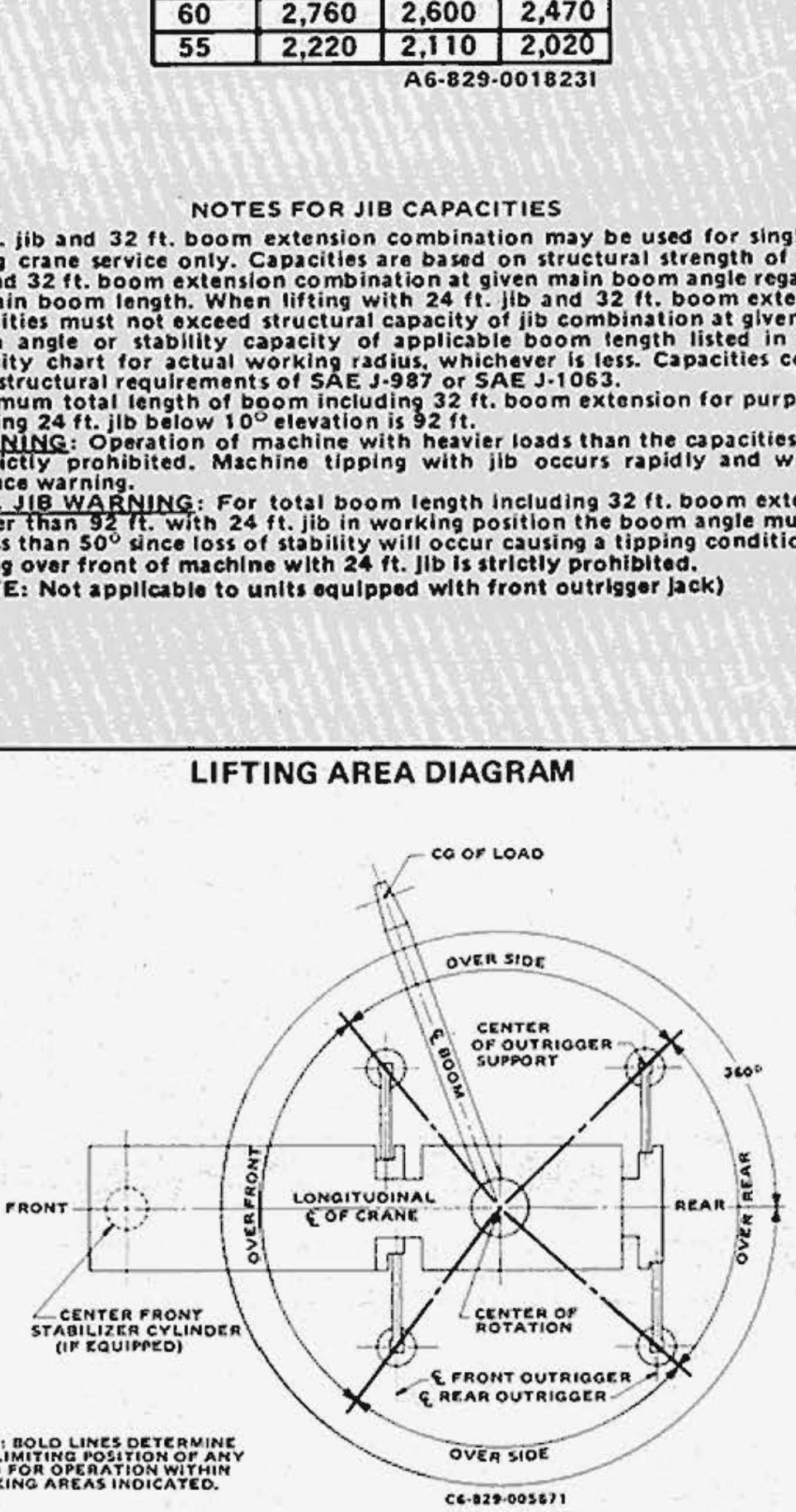
Main Boom Angle	Min. 5° Offset	17° Offset	Max. 30° Offset
76°	6,000	5,200	4,600
70	4,300	3,940	3,650
65	3,430	3,200	3,010
60	2,760	2,600	2,470
55	2,220	2,110	2,020

A6-829-0018231

NOTES FOR JIB CAPACITIES

1. 24 ft. jib and 32 ft. boom extension combination may be used for single line lifting crane service only. Capacities are based on structural strength of 24 ft. jib and 32 ft. boom extension combination at given main boom angle regardless of main boom length. When lifting with 24 ft. jib and 32 ft. boom extension, capacities must not exceed structural capacity of jib combination at given main boom angle or stability capacity of applicable boom length listed in boom capacity chart for actual working radius, whichever is less. Capacities comply with structural requirements of SAE J-987 or SAE J-1063.
2. Maximum total length of boom including 32 ft. boom extension for purpose of erecting 24 ft. jib below 10° elevation is 92 ft.
3. WARNING: Operation of machine with heavier loads than the capacities listed is strictly prohibited. Machine tipping with jib occurs rapidly and without advance warning.
4. 24 ft. JIB WARNING: For total boom length including 32 ft. boom extension greater than 92 ft. with 24 ft. jib in working position the boom angle must not be less than 50° since loss of stability will occur causing a tipping condition.
5. Lifting over front of machine with 24 ft. jib is strictly prohibited. (NOTE: Not applicable to units equipped with front outrigger jack)

LIFTING AREA DIAGRAM

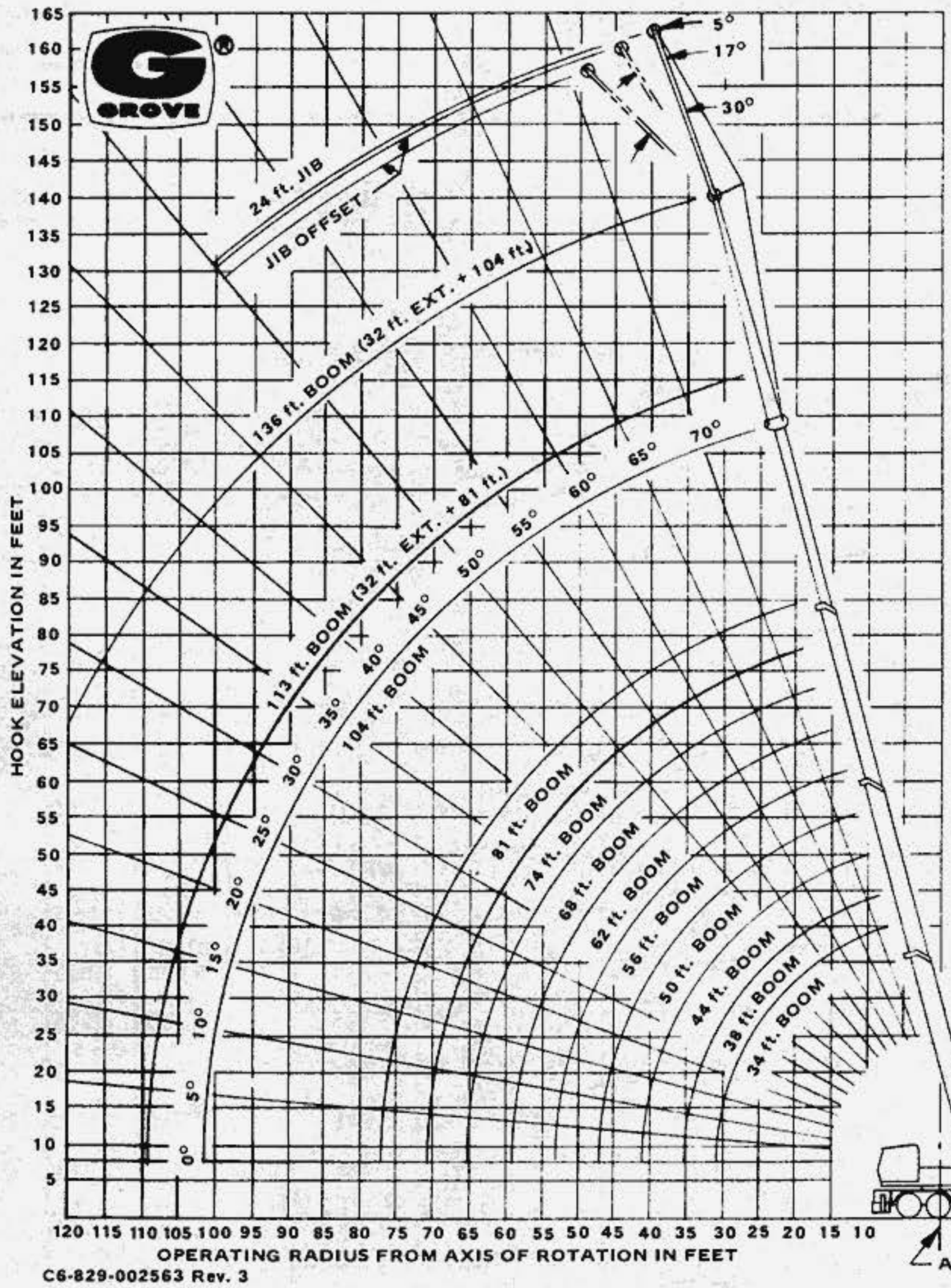


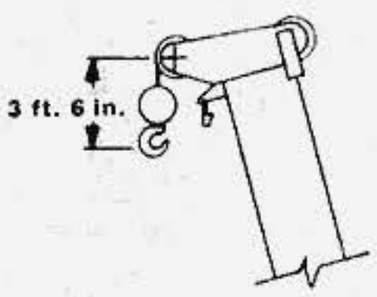
NOTE: BOLD LINES DETERMINE THE LIMITING POSITION OF ANY LOAD FOR OPERATION WITHIN WORKING AREAS INDICATED.

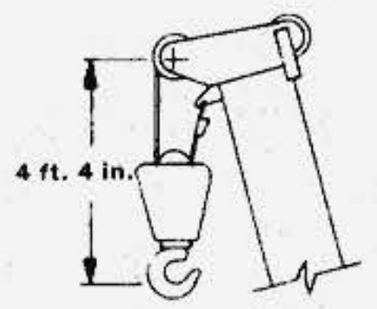
C6-829-005671

GROVE® TMS300B

RANGE DIAGRAM







C6-829-002563 Rev. 3

NOTES FOR LIFTING CAPACITIES

1. Do not exceed any rated lifting capacity. Rated lifting capacities are based on freely suspended loads with the machine leveled and standing on a firm supporting surface. Ratings with outriggers are based on outriggers being extended to their maximum position and tires raised free of crane weight before extending the boom or lifting loads.
2. Practical working loads for each particular job shall be established by the user depending on operating condition to include: the supporting surface, wind and other factors affecting stability, hazardous surroundings, experience of personnel, handling of load, etc. No attempt must be made to move a load horizontally on the ground in any direction.
3. Operating radius is the horizontal distance from the axis of rotation before loading to the centerline of the vertical hoist line or tackle with loads applied.
4. "On Rubber" lifting (if permitted) depends on proper tire inflation, capacity and condition. "On Rubber" loads may be transported at a maximum vehicle speed of 2.5 mi/hr (4 Km/hr) on a firm and level surface under conditions specified.
5. Jibs may be used for lifting crane service only. Jib capacities are based on structural strength of jib or main boom and on main boom angle.
6. Operation is not intended or approved for any conditions outside of those shown hereon. Handling of personnel from the boom is not authorized except with equipment furnished and installed by Grove Manufacturing Company.
7. For clamshell or concrete bucket operation, weight of bucket and load must not exceed 80% of rated lifting capacities.
8. Power-telescoping boom sections must be extended equally at all times. Long cantilever booms can create a tipping condition when in extended and lowered position.
9. The maximum load which may be telescoped is limited by hydraulic pressure, boom angle, boom lubrication, etc. It is safe to attempt to telescope any load within the limits of rated lifting capacity chart.
10. With certain boom and hoist tackle combinations, maximum capacities may not be obtainable with standard cable lengths.
11. With certain boom and load combinations, raising of load with boom lift cylinders may not be possible. Operational safety is not affected by this condition.
12. Keep load handling devices a minimum of 12 inches (30 cm) below boom head when lowering or extending boom.
13. If actual boom length and/or radius is between values listed, use lifting capacity for the next longer rated length and/or radius.
14. All load handling devices and boom attachments are considered part of the load and suitable allowances must be made for their combined weights.
15. Operation of this equipment in excess of rating charts or disregard of the instructions is hazardous and voids the warranty and manufacturer's liability.

WEIGHT REDUCTION FOR LOAD HANDLING DEVICES

32 ft. BOOM EXTENSION		
†STOWED	-	430 lbs.
†ERECTED	-	2,985 lbs.
24 ft. JIB & 32 ft. EXT COMB.		
†STOWED	-	479 lbs.
†ERECTED	-	7,210 lbs.
††ERECTED	-	1,739 lbs.

†Reduction of main boom capacities.
††Reduction of 32 ft. Ext. capacities.

HOOK BLOCK	
40 Ton, 3 Sheave	640 lbs.
15 Ton, 1 Sheave	310 lbs.
Auxiliary Boom Head	190 lbs.
5 Ton Headache Ball	150 lbs.
7½ Ton Headache Ball	300 lbs.
10 Ton Headache Ball	500 lbs.

NOTE: All Load Handling Devices and Boom Attachments are Considered Part of the Load and Suitable Allowances MUST BE MADE for Their Combined Weights.
Weights are for Grove furnished equipment.

When lifting over swingaway and/or jib combination, deduct total weight of all load handling devices reeved over main boom nose directly from swingaway or jib capacity.

GROVE MANUFACTURING COMPANY
Division of Kidde, Inc.
KIDDE
Box 21, Shady Grove, Pennsylvania 17256
Phone: (717) 597-8121 Telex: 842308 Cable: GROVE MFG

Form No. LCETMS300B-136P.P.-85%-1

DATE: 584-15M
Printed in U.S.A.

Distributed by:

RATED LIFTING CAPACITIES IN POUNDS
34 ft. - 104 ft. BOOM

ON OUTRIGGERS - OVER REAR

Radius in Feet	#01									#02
	Main Boom Length in Feet (Power Pinned Fly Retracted)									Power Pin. Fly & 81 ft.
	*34	38	44	50	56	62	68	74	81	104
10	80,000 (69)	68,000 (71.5)	64,000 (74.5)	60,000 (76.5)						See Warning
12	65,000 (65)	62,500 (68)	57,500 (71.5)	54,000 (74)	51,000 (76)	49,000 (77.5)				Note 3
15	57,000 (59.5)	55,000 (63)	50,000 (67.5)	46,500 (70.5)	43,900 (73)	41,900 (74.5)	40,000 (76.5)	38,600 (77.5)		
20	47,000 (48.5)	43,000 (54)	39,500 (60)	36,500 (64)	34,500 (67.5)	32,700 (70)	31,400 (72)	30,000 (73.5)	28,700 (76)	
25	35,675 (35.5)	33,300 (44)	31,000 (52)	30,000 (57.5)	28,100 (61.5)	26,500 (65)	25,300 (67.5)	24,200 (69.5)	23,100 (72)	20,000 (77)
30	25,200 (14)	25,200 (31)	25,200 (43)	25,200 (50)	23,500 (55.5)	22,100 (59.5)	21,000 (62.5)	20,000 (65.5)	19,000 (68)	17,750 (74.5)
35			19,340 (31.5)	19,340 (42)	19,340 (49)	18,700 (54)	17,700 (57.5)	16,800 (61)	16,000 (64.5)	15,600 (71.5)
40			15,190 (13.5)	15,190 (32)	15,190 (41.5)	15,190 (47.5)	15,190 (52.5)	14,400 (56.5)	13,600 (60)	13,100 (68.5)
45				12,310 (18)	12,310 (32.5)	12,310 (41)	12,310 (47)	12,310 (51.5)	11,700 (56)	11,300 (65.5)
50					10,000 (20.5)	10,000 (33)	10,000 (40.5)	10,000 (46)	10,000 (51.5)	9,930 (62)
55						8,180 (22.5)	8,180 (33)	8,180 (40)	8,180 (46.5)	8,710 (59)
60							6,650 (24)	6,650 (33.5)	6,650 (41)	7,680 (55.5)
65							5,280 (3)	5,280 (25)	5,280 (35)	6,800 (52)
70								4,140 (11.5)	4,140 (27.5)	5,990 (48)
75									3,320 (17)	5,000 (44)
80										4,060 (40)
85										3,290 (35)
90										2,730 (29.5)
95										2,210 (22.5)
100										1,680 (10.5)
Minimum boom angle (deg.) for indicated length									0	0
Maximum boom length (ft.) at 0 deg. boom angle									81	104

Note: ( ) Boom angles are in degrees.

A6-829-008513A

#LMI operating code. Refer to LMI manual for instructions.

*See lifting capacity notes on page 2.

Lifting Capacities On Outriggers - Over Rear At Zero Degree Boom Angle										
Boom Angle	Main Boom Length in Feet									
	34	38	44	50	56	62	68	74		
0°	16,700 (30.8)	14,000 (35)	10,700 (41)	7,610 (47)	5,790 (53)	4,310 (59)	3,060 (65)	1,970 (71)		

Note: ( ) Reference radii in feet.

A6-829-009595

RATED LIFTING CAPACITIES IN POUNDS
WITH FRONT JACK CYLINDER
34 ft. - 104 ft. BOOM

ON OUTRIGGERS - 360°

Radius in Feet	#01									#02
	Main Boom Length in Feet (Power Pinned Fly Retracted)									Power Pin. Fly & 81 ft.
	*34	38	44	50	56	62	68	74	81	104
10	80,000 (69)	68,000 (71.5)	64,000 (74.5)	60,000 (76.5)						See Warning
12	65,000 (65)	62,500 (68)	57,500 (71.5)	54,000 (74)	51,000 (76)	49,000 (77.5)				Note 3
15	57,000 (59.5)	55,000 (63)	50,000 (67.5)	46,500 (70.5)	43,900 (73)	41,900 (74.5)	40,000 (76.5)	38,600 (77.5)		
20	46,890 (48.5)	43,000 (54)	39,500 (60)	36,500 (64)	34,500 (67.5)	32,700 (70)	31,400 (72)	30,000 (73.5)	28,700 (76)	
25	29,450 (35.5)	29,450 (44)	29,450 (52)	29,450 (57.5)	28,100 (61.5)	26,500 (65)	25,300 (67.5)	24,200 (69.5)	23,100 (72)	20,000 (77)
30	20,560 (14)	20,560 (31)	20,560 (43)	20,560 (50)	20,560 (55.5)	20,560 (59.5)	20,560 (62.5)	20,000 (65.5)	19,000 (68)	17,750 (74.5)
35			15,450 (31.5)	15,450 (42)	15,450 (49)	15,450 (54)	15,450 (57.5)	15,450 (61)	15,450 (64.5)	15,600 (71.5)
40			11,410 (13.5)	11,410 (32)	11,410 (41.5)	11,410 (47.5)	11,410 (52.5)	11,410 (56.5)	11,410 (60)	13,100 (68.5)
45				8,450 (18)	8,450 (32.5)	8,450 (41)	8,450 (47)	8,450 (51.5)	8,450 (56)	10,990 (65.5)
50					6,630 (20.5)	6,630 (33)	6,630 (40.5)	6,630 (46)	6,630 (51.5)	8,750 (62)
55						5,280 (22.5)	5,280 (33)	5,280 (40)	5,280 (46.5)	7,130 (59)
60							4,090 (24)	4,090 (33.5)	4,090 (41)	5,650 (55.5)
65							3,060 (3)	3,060 (25)	3,060 (35)	4,500 (52)
70								2,150 (11.5)	2,150 (27.5)	3,600 (48)
75									1,300 (17)	2,840 (44)
80										2,150 (40)
85										1,550 (35)
90										1,020 (29.5)
Minimum boom angle (deg.) for indicated length									0	10
Maximum boom length (ft.) at 0 deg. boom angle									81	103

Note: ( ) Boom angles are in degrees. A6-829-008685A

#LMI operating code. Refer to LMI manual for instructions.

*See lifting capacity notes on page 2.

Lifting Capacities On Outriggers - 360 Degrees At Zero Degree Boom Angle										
Boom Angle	Main Boom Length in Feet									
	34	38	44	50	56	62	68	74		
0°	16,700 (30.8)	14,000 (35)	10,700 (41)	7,610 (47)	5,790 (53)	4,310 (59)	3,060 (65)	1,970 (71)		

Note: ( ) Reference radii in feet. A6-829-009595

32 ft. FIXED LENGTH EXTENSION

Main Boom Angle (Deg.)	0° OFFSET		15° OFFSET		30° OFFSET	
	Rad. Ref. ft.	Cap. lbs.	Rad. Ref. ft.	Cap. lbs.	Rad. Ref. ft.	Cap. lbs.
POWER PINNED FLY RETRACTED						
	#51		#52		#53	
75	28.4	18,200	34.4	10,300	38.6	6,900
70	37.4	14,900	43.2	9,000	47.2	6,400
65	46.1	10,500	51.7	8,000	55.5	6,100
60	54.5	6,990	59.7	5,380	63.4	4,440
55	62.4	4,670	67.3	3,560	70.7	2,890
50	69.8	3,040	74.3	2,240	77.5	1,750
45	76.7	1,850	80.7	1,260		
POWER PINNED FLY EXTENDED						
	#55		#56		#57	
75	37.6	11,000	43.8	8,500	47.6	6,400
70	48.6	9,200	54.4	7,500	58.1	5,900
65	59.3	6,220	64.7	4,620	68.2	3,760
60	69.5	3,450	74.5	2,410	77.7	1,820
55	79.2	1,560				

A6-829-008514 & -008518

#LMI operating code. Refer to LMI manual for instructions.

1. All capacities above the bold line are based on structural strength of boom extension and do not exceed 85% of tipping loads, in accordance with SAE J765 OCT80.
2. 32 ft. boom extension length may be used for double or single line lifting service.
3. Rated load is based on loaded main boom angle with reference to horizontal, regardless of main boom length. (Ref. radius is for fully extended boom and power pinned fly extended 104 ft. boom length, or power pinned fly retracted 81 ft. boom length, whichever the case may be.)
   WARNING: Operation of this machine with heavier loads than the capacities listed is strictly prohibited. Machine tipping with boom extension occurs rapidly and without advance warning.
4. Capacities listed are with fully extended outriggers only.
5. BOOM EXT. WARNING FOR POWER PINNED FLY EXTENDED:
   WARNING for 32 FT. BOOM EXTENSION: For main boom length greater than 68 ft. with 32 ft. offsettable boom extension in working position, the boom angle must not be less than 50° since loss of stability will occur causing a tipping condition. The boom angle is not restricted for main boom length equal to or less than 68 ft. This warning applies for boom extension erection purposes also.
6. BOOM EXT. WARNING FOR POWER PINNED FLY RETRACTED:
   WARNING for 32 FT. BOOM EXTENSION: For main boom length greater than 62 ft. with 32 ft. offsettable boom extension in working position, the boom angle must not be less than 40° since loss of stability will occur causing a tipping condition. The boom angle is not restricted for main boom length equal to or less than 62 ft. This warning applies for boom extension erection purposes also.

WEIGHT REDUCTIONS FOR LOAD HANDLING DEVICES

32 ft. Extension with 34 ft.-104 ft. Boom	
*Stowed -	703 lbs.
*Erected -	6,015 lbs.

32 ft. - 56 ft. Tele. Ext. with 34 ft. - 104 ft. Boom	
*Stowed -	916 lbs.
*Erected (ret.) -	7,631 lbs.
*Erected (ext.) -	9,944 lbs.

*Reduction of main boom capacities

HOOKBLOCKS:	
50 Ton, 4 Sheave	700 lbs.
45 Ton, 3 Sheave	1,066 lbs.
25 Ton, 2 Sheave	665 lbs.
15 Ton, 1 Sheave	400 lbs.
Auxiliary Boom Head	190 lbs.
10 Ton Headache Ball	560 lbs.
7 1/2 Ton Headache Ball	338 lbs.

When lifting over swingaway and/or jib combinations, deduct total weight of all load handling devices reeved over main boom nose directly from swingaway or jib capacity.

NOTE: All load handling devices and boom attachments are considered part of the load and suitable allowances MUST BE MADE for their combined weights. Weights are for Grove furnished equipment.

HITACHI

DASH 3

ZAXIS 200-3 / ZAXIS 200LC-3

- **Engine Net Power:** 159 hp (118 kW) @ 2,000 rpm
- **Operating Weight:** 47,015 lb. (21 326 kg)
- **Backhoe Bucket:** 1.19 yd^3 (0.91 m^3)

Engine

Manufacturer and Model ..... Isuzu AH-4HK1XYSA-01 certified to EPA Tier-3 emissions
Net Power (ISO9249) ..... 159 hp (118 kW) @ 2,000 rpm
Cylinders 4
Displacement ..... 317 cu. in. (5.193 L)
Aspiration ..... turbocharged, air-to-air charge air cooler
Off-Level Capacity ..... 70% (35 deg.)

Cooling

Direct-drive suction-type fan

Powertrain

Maximum Travel Speed
Low ..... 2.2 mph (3.5 km/h)
High ..... 3.4 mph (5.5 km/h)

Hydraulics

Open center, load sensing; auxiliary hydraulic flow adjustable through monitor
Main Pumps ..... 2 variable-displacement axial-piston pumps
Maximum Rated Flow ..... 2 x 56 gpm (2 x 212 L/m)
Pilot Pump ..... one gear
Maximum Rated Flow ..... 7.9 gpm (30 L/m)
Pressure Setting ..... 580 psi (3999 kPa)
System Operating Pressure
Implement Circuits ..... 4,980 psi (34 336 kPa)
Travel Circuits ..... 4,980 psi (34 336 kPa)
Swing Circuits ..... 4,980 psi (34 336 kPa)
Power Boost ..... 5,270 psi (36 335 kPa)
Controls ..... pilot levers, short stroke, low effort; hydraulic pilot controls with shutoff lever

Cylinders

Heat-treated, chrome-plated, polished cylinder rods; hardened-steel (replaceable bushings) pivot pins

	Bore	Rod Diameter	Stroke
Boom (2)	4.72 in. (120 mm)	3.35 in. (85 mm)	49.61 in. (1260 mm)
Arm (1)	5.31 in. (135 mm)	3.74 in. (95 mm)	58.07 in. (1475 mm)
Bucket (1)	4.53 in. (115 mm)	3.15 in. (80 mm)	41.73 in. (1060 mm)

Electrical

Batteries ..... 2 x 12 volt
Alternator Rating ..... 50 amp
Work Lights ..... 2 halogen (one mounted on boom, one mounted on frame)

Undercarriage

	200-3	*200LC-3*
Planetary final drives with axial-piston motors		
Carrier Rollers (per side)	2	2
Track Rollers (per side)	7	8
Shoes (per side)	46	49
Drawbar Pull	45,620 lb. (20 711 kg)	45,620 lb. (20 711 kg)
Track		
Adjustment	hydraulic	hydraulic
Guides	center	center
Chain	sealed and lubricated	sealed and lubricated

Swing Mechanism

Swing Speed ..... 13.3 rpm
Swing Torque ..... 50,662 lb.-ft. (68 900 Nm)

Ground Pressure

	200-3	*200LC-3*
Triple Semi-Grouser Shoes		
24 in. (600 mm)	6.5 psi (45 kPa)	6.09 psi (42 kPa)
28 in. (700 mm)	5.8 psi (40 kPa)	5.37 psi (37 kPa)
32 in. (800 mm)	5.07 psi (35 kPa)	5.29 psi (36.5 kPa)

Serviceability

Refill Capacities

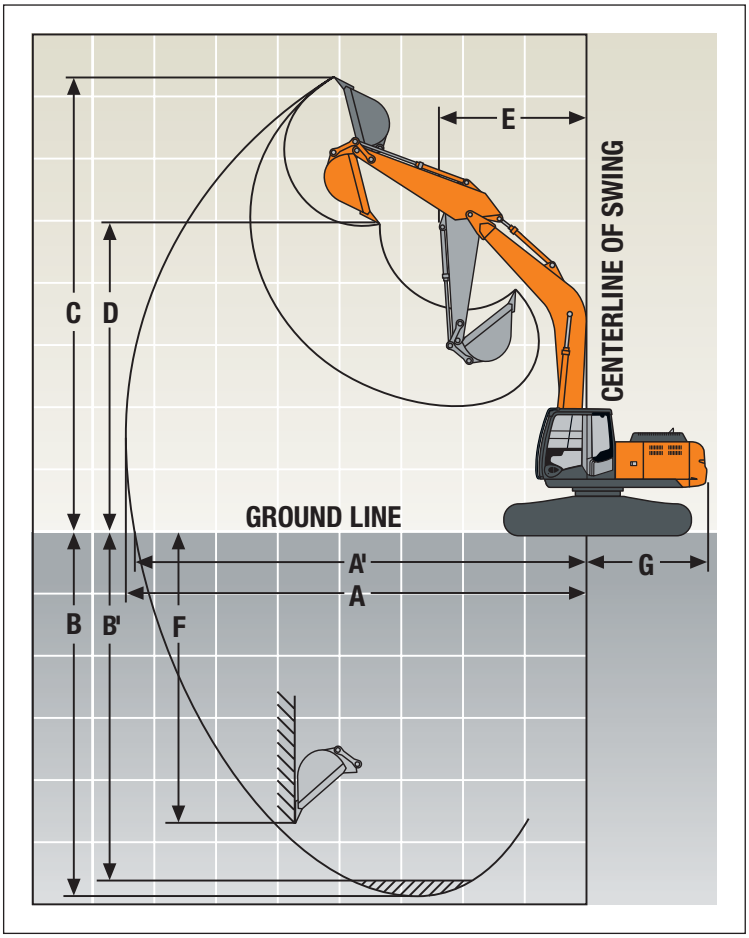
Fuel Tank	106 gal. (400 L)
Cooling System	27.6 qt. (26.1 L)
Engine Oil with Filter	24 qt. (23 L)
Hydraulic Tank	36 gal. (135 L)
Hydraulic System	63.4 gal. (240 L)
Gearbox	
Propel (each)	7.2 qt. (6.8 L)
Swing	7 qt. (6.2 L)
Pump Drive	1.1 qt. (1 L)

Operating Weights

	200-3	*200LC-3*
With Full Fuel Tank; 175-lb. (79 kg) Operator; 42-in. (1065 mm), 1.19-cu.-yd. (0.91 m^3), 1,951-lb. (886 kg) Heavy-Duty Bucket; 9-ft. 7-in. (2.91 m) Arm; 10,463-lb. (4750 kg) Counterweight; and 32-in. (800 mm) Triple Semi-Grouser Shoes	45,692 lb. (20 726 kg)	47,015 lb. (21 326 kg)
Optional Components		
Undercarriage with Triple Semi-Grouser Shoes		
24 in. (600 mm)	14,873 lb. (6752 kg)	16,196 lb. (7353 kg)
28 in. (700 mm)	15,733 lb. (7143 kg)	17,056 lb. (7743 kg)
32 in. (800 mm)	16,381 lb. (7437 kg)	17,704 lb. (8038 kg)
One-Piece Boom (with arm cylinder)	3,815 lb. (1732 kg)	3,815 lb. (1732 kg)
Arm with Bucket Cylinder and Linkage		
7 ft. 11 in. (2.42 m)	2,044 lb. (928 kg)	2,044 lb. (928 kg)
9 ft. 7 in. (2.91 m)	2,181 lb. (990 kg)	2,181 lb. (990 kg)
Boom Lift Cylinders (2) Total Weight	750 lb. (341 kg)	750 lb. (341 kg)
42-in. (1065 mm), 1.19-cu.-yd. (0.91 m^3) Heavy-Duty Bucket	1,951 lb. (886 kg)	1,951 lb. (886 kg)
Counterweight (standard)	10,463 lb. (4750 kg)	10,463 lb. (4750 kg)

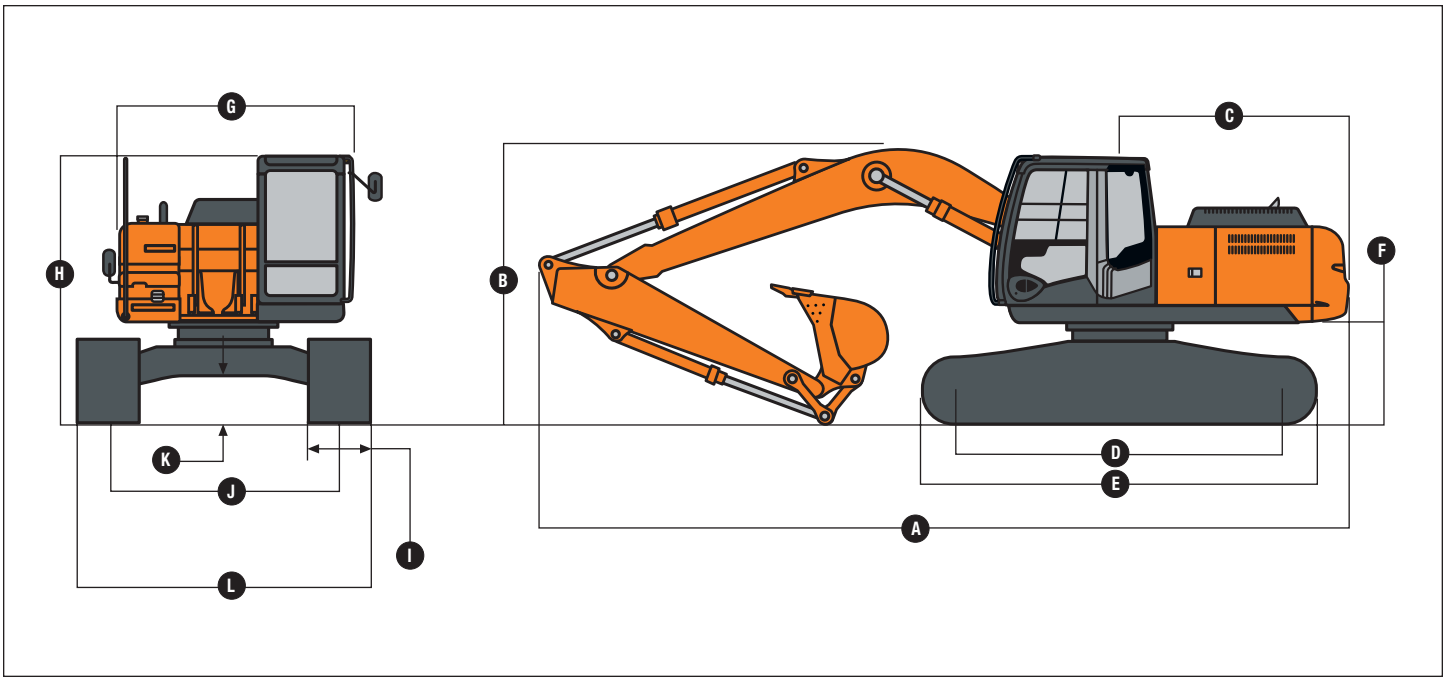
Operating Dimensions

		200-3		200LC-3	
		Arm Length 7 ft. 11 in. (2.42 m)	*Arm Length 9 ft. 7 in. (2.91 m)*	*Arm Length 7 ft. 11 in. (2.42 m)*	*Arm Length 9 ft. 7 in. (2.91 m)*
	Arm Force with 42-in. (1065 mm) Heavy-Duty Bucket with Power Boost	27,877 lb. (124 kN)	22,924 lb. (102 kN)	27,877 lb. (124 kN)	22,924 lb. (102 kN)
	Bucket Digging Force with 42-in. (1065 mm) 1.19-cu.-yd. (0.91 m^3) Heavy-Duty Bucket with Power Boost	29,099 lb. (129.4 kN)	29,099 lb. (129.4 kN)	29,099 lb. (129.4 kN)	29,099 lb. (129.4 kN)
	Lifting Capacity Over Front at Ground Level 20-ft. (6.1 m) Reach with Power Boost	14,607 lb. (6632 kg)	13,223 lb. (6003 kg)	14,533 lb. (6598 kg)	14,248 lb. (6469 kg)
A	Maximum Reach	30 ft. 11 in. (9.43 m)	32 ft. 7 in. (9.92 m)	30 ft. 11 in. (9.43 m)	32 ft. 7 in. (9.92 m)
A'	Maximum Reach at Ground Level	30 ft. 4 in. (9.25 m)	32 ft. (9.75 m)	30 ft. 4 in. (9.25 m)	32 ft. (9.75 m)
B	Maximum Digging Depth	20 ft. 3 in. (6.18 m)	21 ft. 11 in. (6.68 m)	20 ft. 3 in. (6.18 m)	21 ft. 11 in. (6.68 m)
B'	Maximum Digging Depth at 8-ft. (2.44 m) Flat Bottom	19 ft. 6 in. (5.95 m)	21 ft. 4 in. (6.50 m)	19 ft. 6 in. (5.95 m)	21 ft. 4 in. (6.50 m)
C	Maximum Cutting Height	31 ft. 9 in. (9.67 m)	32 ft. 11 in. (10.04 m)	31 ft. 9 in. (9.67 m)	32 ft. 11 in. (10.04 m)
D	Maximum Dumping Height	22 ft. 5 in. (6.83 m)	23 ft. 7 in. (7.18 m)	22 ft. 5 in. (6.83 m)	23 ft. 7 in. (7.18 m)
E	Minimum Swing Radius	10 ft. 9 in. (3.28 m)	10 ft. 5 in. (3.18 m)	10 ft. 9 in. (3.28 m)	10 ft. 5 in. (3.18 m)
F	Maximum Vertical Wall	17 ft. 5 in. (5.30 m)	19 ft. 8 in. (5.99 m)	17 ft. 5 in. (5.30 m)	19 ft. 8 in. (5.99 m)
G	Tail Swing Radius	9 ft. (2.75 m)	9 ft. (2.75 m)	9 ft. (2.75 m)	9 ft. (2.75 m)



Machine Dimensions

		200-3		200LC-3	
		Arm Length	*Arm Length*	*Arm Length*	*Arm Length*
		7 ft. 11 in. (2.42 m)	*9 ft. 7 in. (2.91 m)*	*7 ft. 11 in. (2.42 m)*	*9 ft. 7 in. (2.91 m)*
A	Overall Length	31 ft. 6 in. (9.60 m)	31 ft. 3 in. (9.53 m)	31 ft. 6 in. (9.60 m)	31 ft. 3 in. (9.53 m)
B	Overall Height	10 ft. 5 in. (3.18 m)	9 ft. 8 in. (2.95 m)	10 ft. 5 in. (3.18 m)	9 ft. 8 in. (2.95 m)
C	Rear-End Length/Swing Radius	9 ft. (2.75 m)	9 ft. (2.75 m)	9 ft. (2.75 m)	9 ft. (2.75 m)
D	Distance Between Idler/Sprocket Centerline	11 ft. (3.35 m)	11 ft. (3.35 m)	12 ft. (3.67 m)	12 ft. (3.67 m)
E	Undercarriage Length	13 ft. 8 in. (4.17 m)	13 ft. 8 in. (4.17 m)	14 ft. 8 in. (4.46 m)	14 ft. 8 in. (4.46 m)
F	Counterweight Clearance	3 ft. 5 in. (1031 mm)	3 ft. 5 in. (1031 mm)	3 ft. 5 in. (1031 mm)	3 ft. 5 in. (1031 mm)
G	Upperstructure Width	8 ft. 11 in. (2.71 m)	8 ft. 11 in. (2.71 m)	8 ft. 11 in. (2.71 m)	8 ft. 11 in. (2.71 m)
H	Cab Height	9 ft. 8 in. (2.95 m)	9 ft. 8 in. (2.95 m)	9 ft. 8 in. (2.95 m)	9 ft. 8 in. (2.95 m)
I	Track Width with Triple Semi-Grouser Shoes	24 in. (600 mm)	24 in. (600 mm)	24 in. (600 mm)	24 in. (600 mm)
		28 in. (700 mm)	28 in. (700 mm)	28 in. (700 mm)	28 in. (700 mm)
		32 in. (800 mm)	32 in. (800 mm)	32 in. (800 mm)	32 in. (800 mm)
J	Gauge Width	7 ft. 10 in. (2.39 m)	7 ft. 10 in. (2.39 m)	7 ft. 10 in. (2.39 m)	7 ft. 10 in. (2.39 m)
K	Ground Clearance	18 in. (450 mm)	18 in. (450 mm)	18 in. (450 mm)	18 in. (450 mm)
L	Overall Width with Triple Semi-Grouser Shoes				
	24 in. (600 mm)	9 ft. 10 in. (2.99 m)	9 ft. 10 in. (2.99 m)	9 ft. 10 in. (2.99 m)	9 ft. 10 in. (2.99 m)
	28 in. (700 mm)	10 ft. 2 in. (3.09 m)	10 ft. 2 in. (3.09 m)	10 ft. 2 in. (3.09 m)	10 ft. 2 in. (3.09 m)
	32 in. (800 mm)	10 ft. 6 in. (3.19 m)	10 ft. 6 in. (3.19 m)	10 ft. 6 in. (3.19 m)	10 ft. 6 in. (3.19 m)



Lift Charts

Boldface italic type indicates hydraulic-limited capacities; lightface type indicates stability-limited capacities, in lb. (kg). Ratings are at bucket lift hook, using 1.12-cu.-yd. (0.86 m³) bucket; standard counterweight, situated on firm, level, uniform supporting surface. Figures do not exceed 87 percent of hydraulic capacity or 75 percent of weight needed to tip machine.

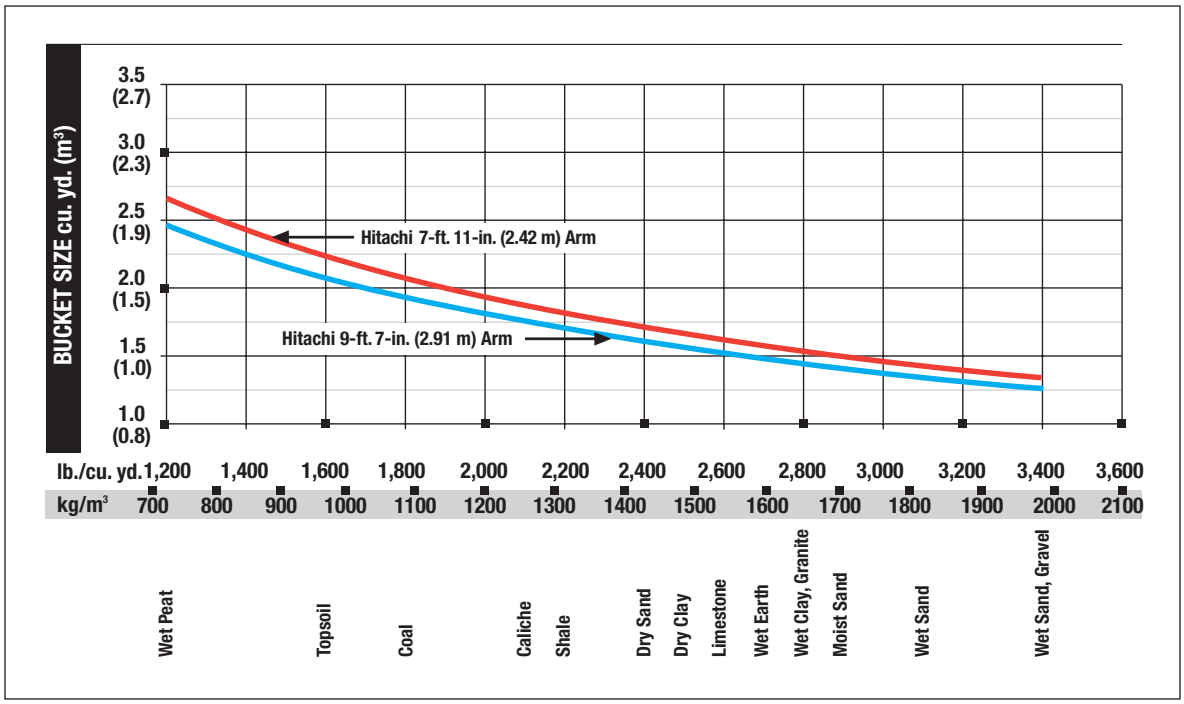
Load Point	10 ft. (3.05 m)		15 ft. (4.57 m)		20 ft. (6.10 m)		25 ft. (7.62 m)	
Height	Over Front	Over Side	Over Front	Over Side	Over Front	Over Side	Over Front	Over Side
200-3 with 9-ft. 7-in. (2.91 m) arm and 28-in. (700 mm) triple semi-grouser shoes								
20 ft. (6.10 m)					***8,048 (3651)***	***8,048 (3651)***		
15 ft. (4.57 m)					***8,970 (4069)***	***8,970 (4069)***	***8,574 (3889)***	6,523 (2959)
10 ft. (3.05 m)			***13,847 (6281)***	***13,847 (6281)***	***10,757 (4879)***	9,161 (4155)	***9,329 (4232)***	6,290 (2853)
5 ft. (1.52 m)			***18,108 (8214)***	13,135 (5958)	***12,766 (5791)***	8,578 (3891)	9,515 (4316)	6,004 (2723)
Ground Line			***20,308 (9212)***	12,435 (5640)	13,103 (5943)	8,139 (3692)	9,255 (4198)	5,765 (2615)
–5 ft. (–1.52 m)	***14,425 (6543)***	***14,425 (6543)***	***20,412 (9259)***	12,245 (5554)	12,866 (5836)	7,925 (3595)	9,120 (4137)	5,641 (2559)
–10 ft. (–3.05 m)	***23,940 (10 859)***	***23,940 (10 859)***	***18,971 (8605)***	12,337 (5596)	12,873 (5839)	7,931 (3597)	9,183 (4165)	5,699 (2585)
–15 ft. (–4.57 m)	***20,943 (9500)***	***20,943 (9500)***	***5,628 (7089)***	12,683 (5753)	***11,249 (5102)***	8,204 (3721)		
200-3 with 9-ft. 7-in. (2.91 m) arm and 32-in. (800 mm) triple semi-grouser shoes								
20 ft. (6.10 m)					***8,048 (3651)***	***8,048 (3651)***		
15 ft. (4.57 m)					***8,970 (4069)***	***8,970 (4069)***	***8,574 (3889)***	6,581 (2985)
10 ft. (3.05 m)			***13,847 (6281)***	***13,847 (6281)***	***10,757 (4879)***	9,237 (4190)	***9,329 (4232)***	6,348 (2879)
5 ft. (1.52 m)			***18,108 (8214)***	13,244 (6007)	***12,766 (5791)***	8,653 (3925)	***9,603 (4356)***	6,062 (2750)
Ground Line			***20,308 (9212)***	12,545 (5690)	13,223 (5998)	8,214 (3726)	9,344 (4238)	5,822 (2641)
–5 ft. (–1.52 m)	***14,425 (6543)***	***14,425 (6543)***	***20,412 (9259)***	12,354 (5604)	12,985 (5890)	8,001 (3629)	9,209 (4177)	5,698 (2585)
–10 ft. (–3.05 m)	***23,940 (10 859)***	***23,940 (10 859)***	***18,971 (8605)***	12,446 (5645)	12,992 (5893)	8,007 (3632)	9,272 (4206)	5,756 (2611)
–15 ft. (–4.57 m)	***20,943 (9500)***	***20,943 (9500)***	***15,628 (7089)***	12,792 (5802)	***11,249 (5102)***	8,279 (3755)		
200LC-3 with 7-ft. 11-in. (2.42 m) arm and 32-in. (800 mm) triple semi-grouser shoes								
20 ft. (6.10 m)					***9,001 (4083)***	***9,001 (4083)***		
15 ft. (4.57 m)			***11,212 (5086)***	***11,212 (5086)***	***9,795 (4443)***	***9,795 (4443)***	***9,278 (4208)***	7,199 (3265)
10 ft. (3.05 m)			***15,341 (6959)***	***15,341 (6959)***	***11,500 (5216)***	10,132 (4596)	***9,847 (4467)***	7,008 (3179)
5 ft. (1.52 m)					***13,340 (6051)***	9,589 (4349)	***10,677 (4843)***	6,755 (3064)
Ground Line			***20,586 (9338)***	14,165 (6425)	***14,533 (6592)***	9,216 (4180)	10,682 (4845)	6,557 (2974)
–5 ft. (–1.52 m)			***20,010 (9076)***	14,109 (6400)	***14,669 (6654)***	9,073 (4115)	10,607 (4811)	6,488 (2943)
–10 ft. (–3.05 m)	***20,215 (9169)***	***20,215 (9169)***	***18,022 (8175)***	14,284 (6479)	***13,444 (6098)***	9,153 (4152)		
–15 ft. (–4.57 m)	***17,763 (8057)***	***17,763 (8057)***	***13,813 (6265)***	***13,813 (6265)***				
200LC-3 with 9-ft. 7-in. (2.91 m) arm and 24-in. (600 mm) triple semi-grouser shoes								
20 ft. (6.10 m)					***8,048 (3651)***	***8,048 (3651)***		
15 ft. (4.57 m)					***8,970 (4069)***	***8,970 (4069)***	***8,574 (3889)***	7,158 (3247)
10 ft. (3.05 m)			***13,847 (6281)***	***13,847 (6281)***	***10,757 (4879)***	10,049 (4558)	***9,329 (4232)***	6,922 (3140)
5 ft. (1.52 m)			***18,108 (8214)***	14,549 (6599)	***12,766 (5791)***	9,454 (4288)	***10,309 (4676)***	6,632 (3008)
Ground Line			***20,308 (9212)***	13,829 (6273)	***14,248 (6463)***	9,007 (4086)	10,390 (4713)	6,389 (2898)
–5 ft. (–1.52 m)	***14,425 (6543)***	***14,425 (6543)***	***20,412 (9259)***	13,633 (6184)	14,529 (6590)	8,789 (3987)	10,251 (4650)	6,263 (2841)
–10 ft. (–3.05 m)	***23,940 (10 859)***	***23,940 (10 859)***	***18,971 (8605)***	13,728 (6227)	***14,028 (6363)***	8,795 (3989)	10,316 (4679)	6,321 (2867)
–15 ft. (–4.57 m)	***20,943 (9500)***	***20,943 (9500)***	***15,628 (7089)***	14,083 (6388)	***11,249 (5102)***	9,073 (4115)		
200LC-3 with 9-ft. 7-in. (2.91 m) arm and 28-in. (700 mm) triple semi-grouser shoes								
20 ft. (6.10 m)					***8,048 (3651)***	***8,048 (3651)***		
15 ft. (4.57 m)					***8,970 (4069)***	***8,970 (4069)***	***8,574 (3889)***	7,288 (3306)
10 ft. (3.05 m)			***13,847 (6281)***	***13,847 (6281)***	***10,757 (4879)***	10,221 (4636)	***9,329 (4232)***	7,052 (3199)
5 ft. (1.52 m)			***18,108 (8214)***	14,799 (6713)	***12,766 (5791)***	9,625 (4366)	***10,309 (4676)***	6,762 (3067)
Ground Line			***20,308 (9212)***	14,079 (6386)	***14,248 (6463)***	9,178 (4163)	10,593 (4805)	6,519 (2957)
–5 ft. (–1.52 m)	***14,425 (6543)***	***14,425 (6543)***	***20,412 (9259)***	13,883 (6297)	***14,751 (6691)***	8,960 (4064)	10,455 (4742)	6,393 (2900)
–10 ft. (–3.05 m)	***23,940 (10 859)***	***23,940 (10 859)***	***18,971 (8605)***	13,978 (6340)	***14,028 (6363)***	8,966 (4067)	***10,316 (4679)***	6,451 (2926)
–15 ft. (–4.57 m)	***20,943 (9500)***	***20,943 (9500)***	***15,628 (7089)***	14,334 (6502)	***11,249 (5102)***	9,244 (4193)		
200LC-3 with 9-ft. 7-in. (2.91 m) arm and 32-in. (800 mm) triple semi-grouser shoes								
20 ft. (6.10 m)					***8,048 (3651)***	***8,048 (3651)***		
15 ft. (4.57 m)					***8,970 (4069)***	***8,970 (4069)***	***8,574 (3889)***	7,389 (3352)
10 ft. (3.05 m)			***13,847 (6281)***	***13,847 (6281)***	***10,757 (4879)***	10,353 (4696)	***9,329 (4232)***	7,152 (3244)
5 ft. (1.52 m)			***18,108 (8214)***	14,992 (6800)	***12,766 (5791)***	9,758 (4426)	***10,309 (4676)***	6,862 (3113)
Ground Line			***20,308 (9212)***	14,272 (6474)	***14,248 (6463)***	9,310 (4223)	10,750 (4876)	6,619 (3002)
–5 ft. (–1.52 m)	***14,425 (6543)***	***14,425 (6543)***	***20,412 (9259)***	14,076 (6385)	***14,751 (6691)***	9,092 (4124)	10,612 (4814)	6,493 (2945)
–10 ft. (–3.05 m)	***23,940 (10 859)***	***23,940 (10 859)***	***18,971 (8605)***	14,171 (6428)	***14,028 (6363)***	9,098 (4127)	***10,316 (4679)***	6,552 (2972)
–15 ft. (–4.57 m)	***20,943 (9500)***	***20,943 (9500)***	***15,628 (7089)***	14,527 (6589)	***11,249 (5102)***	9,376 (4253)		

Buckets

A full line of buckets is offered to meet a wide variety of applications. Digging forces are with power boost. Replaceable cutting edges are available through Hitachi parts. Optional side cutters add 6 inches (150 mm) to bucket widths. Capacities are SAE heaped ratings.

Type Bucket	Bucket Width		Bucket Capacity*		Weight		Bucket Dig Force		Arm Dig Force 7 ft. 11 in. (2.42 m)		Arm Dig Force 9 ft. 7 in. (2.91 m)		Bucket Tip Radius		No. Teeth
	in.	mm	cu. yd.	m^3	lb.	kg	lb.	kN	lb.	kN	lb.	kN	in.	mm	
General-Purpose	30	760	0.79	0.60	1,432	650	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	4
High Capacity	36	915	1.00	0.76	1,621	736	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	5
	42	1065	1.22	0.93	1,790	813	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	5
	48	1220	1.43	1.09	1,976	897	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	6
Heavy Duty	24	610	0.52	0.40	1,197	543	29,099	129.4	27,877	124.0	22,924	102.0	57.61	1463	4
	30	760	0.71	0.54	1,369	622	29,099	129.4	27,877	124.0	22,924	102.0	57.61	1463	4
	36	915	0.90	0.69	1,559	708	29,099	129.4	27,877	124.0	22,924	102.0	57.61	1463	5
	42	1065	1.09	0.83	1,731	786	29,099	129.4	27,877	124.0	22,924	102.0	57.61	1463	5
	48	1220	1.29	0.99	1,921	872	29,099	129.4	27,877	124.0	22,924	102.0	57.61	1463	6
Heavy-Duty	24	610	0.56	0.43	1,424	646	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	4
High Capacity	30	760	0.76	0.58	1,593	723	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	4
	36	915	0.97	0.74	1,782	809	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	5
	42	1065	1.19	0.91	1,951	886	28,904	128.6	27,806	123.7	22,873	101.7	58.00	1473	5
Ditching	60	1524	1.14	0.87	1,271	577	40,279	179.2	31,133	138.5	25,271	112.4	41.62	1057	0

Bucket Selection Guide*



*Contact your Hitachi dealer for optimum bucket and attachment selections. These recommendations are for general conditions and average use. Does not include optional equipment such as thumbs or couplers. Larger buckets may be possible when using light materials, for flat and level operations, less compacted materials, and volume loading applications such as mass excavation applications in ideal conditions. Smaller buckets are recommended for adverse conditions such as off-level applications, rocks, and uneven surfaces. Bucket capacity indicated is SAE heaped.

Equipment

Key ● Standard Equipment ▲ Optional or Special Equipment

Engine

- ● Certified to EPA Tier-3 emissions
- ● H/P mode control
- ● E mode control
- ● 50 A alternator
- ● Dry-type air filter with evacuator valve (with air filter restriction switch for monitor)
- ● Cartridge-type engine oil filter
- ● Cartridge-type fuel double filters
- ● Air cleaner double filters
- ● Radiator, oil cooler and intercooler with dust protective net
- ● Radiator reserve tank
- ● Fan guard
- ● Isolation-mounted engine
- ● Auto-idle system
- ● Fuel cooler
- ● Glow-plug start aid
- ● Engine oil drain coupler

Hydraulic System

- ● Reduced-drift valve for boom down, arm in
- ● Auxiliary hydraulic valve section
- ● Spring-applied, hydraulically released automatic swing brake
- ● Auxiliary hydraulic-flow adjustments through monitor
- ● Auto power lift
- ● 5,000-hour hydraulic-oil-change interval
- ● Hydraulic-oil-sampling valve
- ▲ Auxiliary hydraulic lines
- ▲ Auxiliary pilot and electric controls
- ▲ Hydraulic filter restriction indicator kit
- ▲ Load-lowering control device
- ▲ Single-pedal propel control
- ▲ Control pattern change valve

Undercarriage

- ● Planetary drive with axial piston motors
- ● Propel motor shields
- ● Spring-applied, hydraulically released automatic propel brake
- ● Track guides, front idler and center
- ● Two-speed propel with automatic shift
- ● Upper carrier rollers (2)
- ● Sealed and lubricated track chain
- ▲ Triple semi-grouser shoes, 24 in. (600 mm)
- ▲ Triple semi-grouser shoes, 28 in. (700 mm)
- ▲ Triple semi-grouser shoes, 32 in. (800 mm)

Upperstructure

- ● Right- and left-hand mirrors
- ● Vandal locks with ignition key: Cab door / Fuel cap / Service doors / Toolbox
- ● Remote-mounted engine oil and fuel filters

Front Attachments

- ● Centralized lubrication system
- ● Dirt seals on all bucket pins
- ● Less boom and arm
- ● HN bushings
- ● Reinforced resin thrust plates
- ● Tungsten carbide thermal coating on arm-to-bucket joint
- ▲ Arm, 7 ft. 11 in. (2.42 m)
- ▲ Arm, 9 ft. 7 in. (2.91 m)
- ▲ Attachment quick-couplers
- ▲ Boom cylinder with plumbing to mainframe for less boom and arm
- ▲ Buckets: Ditching / Heavy duty / Heavy-duty high capacity / Side cutters and teeth
- ▲ Material clamps
- ▲ Super-long fronts

Operator's Station

- ● Adjustable independent control positions (levers-to-seat, seat-to-pedals)
- ● AM/FM radio
- ● Auto climate control/air conditioner, 20,000 Btu/hr. (5.9 kW) with heater and pressurizer
- ● Built-in Operator's Manual storage compartment and manual
- ● Cell-phone power outlet, 12 volt, 60 watt, 5 amp
- ● Coat hook
- ● Deluxe suspension cloth seat with 4-in. (100 mm) adjustable armrests
- ● Floor mat
- ● Front windshield wiper with intermittent speeds
- ● Gauges (illuminated): Engine coolant / Fuel
- ● Horn, electric
- ● Hourmeter, electric
- ● Hydraulic shutoff lever, all controls
- ● Hydraulic warm-up control
- ● Interior light
- ● Large cup holder
- ● Machine Information Center (MIC)
- ● Mode selectors (illuminated): Power modes – three / Travel modes – two with automatic shift / Work mode – one

Operator's Station *(continued)*

- ● Multifunction, color LCD monitor with: Diagnostic capability / Multiple-language capabilities / Maintenance tracking / Clock / System monitoring with alarm features: Auto-idle indicator, engine air cleaner restriction indicator light, engine check, engine coolant temperature indicator light with audible alarm, engine oil pressure indicator light with audible alarm, low-alternator-charge indicator light, low-fuel indicator light, fault code alert indicator, fuel-rate display, wiper-mode indicator, work-lights-on indicator, and work-mode indicator
- ▲ Monitor system with alarm features: Hydraulic oil filter restriction indicator light
- ● Motion alarm with cancel switch (conforms to SAE J994)
- ● Power-boost switch on right console lever
- ● Auxiliary hydraulic control switches in right console lever
- ● SAE two-lever control pattern
- ● Seat belt, 2 in. (51 mm), retractable
- ▲ Seat belt, 3 in. (76 mm), non-retractable
- ● Tinted glass
- ● Transparent tinted overhead hatch
- ● Hot/cold beverage compartment
- ▲ Air-suspension heated seat
- ▲ 24- to 12-volt D.C. radio convertors, 10 amp
- ▲ Protection screens for cab front, rear, and side
- ▲ Window vandal protection covers

Electrical

- ● 50-amp alternator
- ● Blade-type multi-fused circuits
- ● Positive terminal battery covers
- ▲ Cab extension wiring harness
- ● ZXLink™ Ultimate wireless communication system with 3 years of service

Lights

- ● Work lights: Halogen / One mounted on boom / One mounted on frame

Control Owning and Operating Costs

Customer Personal Service (CPS) is part of Hitachi's proactive, fix-before-fail strategy on machine maintenance that will help control costs, increase profits, and reduce stress. Included in this comprehensive lineup of ongoing programs and services are:

Fluid analysis program – tells you what's going on inside all of your machine's major components so you'll know if there's a problem before yousee a decline in performance. Fluid analysis is included in most extended coverage and preventive-maintenance agreements.

Preventive Maintenance (PM) agreements – give you a fixed cost for maintaining a machine for a given period of time. They also help you avoid downtime by ensuring that critical maintenance work gets done right and on schedule. On-site preventive maintenance service performed where and when you need it helps protect you from the expense of catastrophic failures and lets you avoid waste-disposal hassles.

Extended warranty coverage – gives you a fixed cost for machine repairs for a given period of time so you can effectively manage expenses. Whether you work in a severe-service setting, or you just want to spread the risk of doing business, this is a great way to custom-fit coverage to your operation. Choose from engine, powertrain, powertrain with hydraulics, or full-machine two-year/2,000-hour or three-year/3,000-hour coverage. An extended coverage contract travels well because it's backed by Hitachi and is honored by all Hitachi construction dealers. What's more, extended coverage is fully transferable at no extra charge, so it adds value at trade-in.

Customer Support Advisors (CSAs) – Hitachi believes the CSA program lends a personal quality to Customer Personal Service (CPS). Certified CSAs have the knowledge and skills for helping make important decisions on machine maintenance and repair. Their mission is to help you implement a plan that's right for your business and take the burden of machine maintenance off your shoulders.

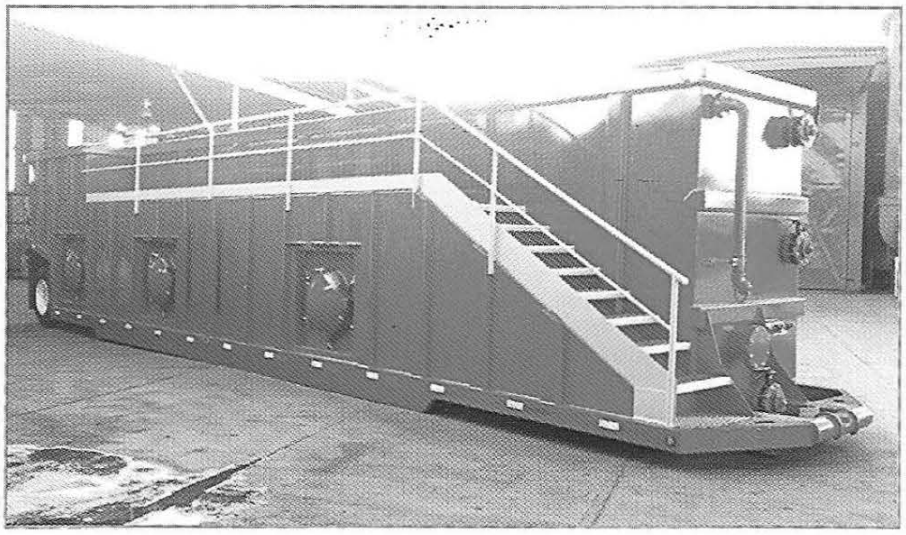
Net engine power is with standard equipment including air cleaner, exhaust system, alternator, and cooling fan at test conditions per ISO9249. No derating is required up to 10,000-ft. (3050 m) altitude. Specifications and design subject to change without notice. Wherever applicable, specifications are in accordance with SAE standards. Except where otherwise noted, these specifications are based on units with 9-ft. 7-in. (2.91 m) arms; 42-in. (1065 mm), 1.19-cu. yd. (0.91 m³), 1,951-lb. (886 kg) heavy-duty buckets; 10,463-lb. (4750 kg) counterweights; full fuel tanks; and 175-lb. (79 kg) operators; and a 200LC-3 unit with 32-in. (800 mm) triple semi-grouser shoes.

HITACHI

DKAZX200HT Litho in U.S.A. (09-05)

The Product

WEIR TANK

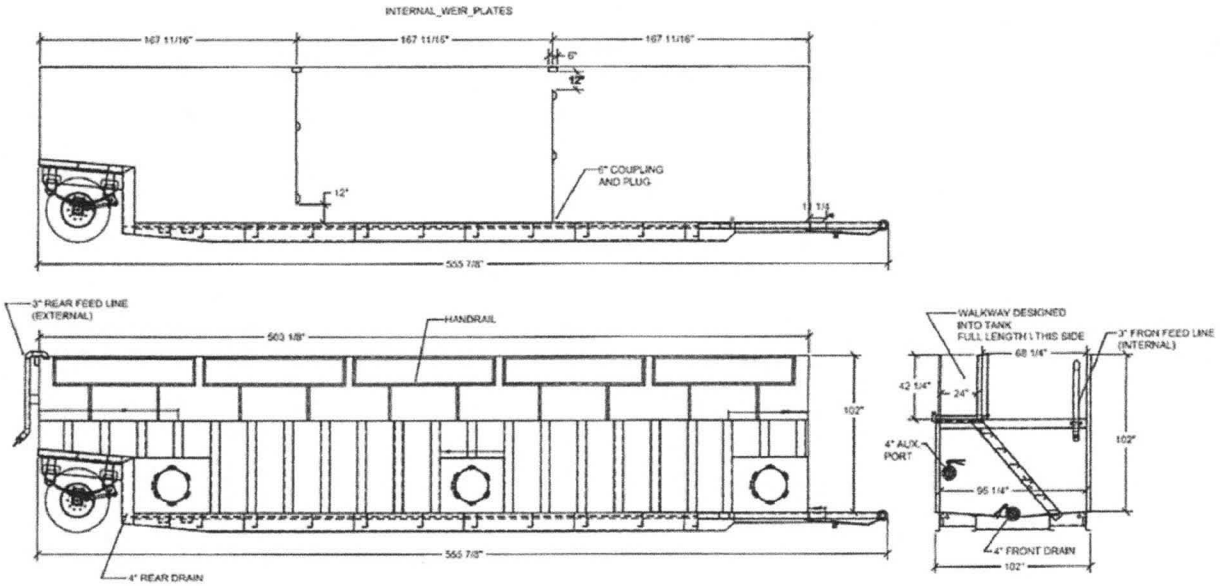


Capacity	18,100 Gallons
Length	540 in. Width 102 in. Height 114 in.
Sides	¼" Plate A36 Welded construction.
Floor	¼ "Plate A36 Welded construction.
Manways	3-21"O.D. Steel with Buna -N Gaskets.
Valving	3-4" Butterfly Valves
Suspension	Spring - 22.5 k capacity
Axle	5" rd. 71.5" track, 22.5 k capacity
Tires	11R24.5- 5-14 ply
Wheels	Steel 8.25 x 24.5
Blast:	Interior -SSPC-SP10/ Exterior SSPC-SP6
Interior paint	100% solids Epoxy- Gray primer (20- 30 mils)
Exterior paint	Primer coat high solids epoxy primer (4 to 6 mils)
	Finish coat Polyurethane (2 to 4 mils)
Weirs	2- welded
Stairway & grating	Stairway up side and walkway down to last weir.

- HYDRO-TESTED
- QUALITY CONSTRUCTION
- NON-CORRUGATED WALLS FOR QUICK CLEAN
- FLOOR SYSTEM "QUICK CLEAN", POSITIVE FLOW FOR TOTAL DRAIN CAPABILITY
- EASY ACCESS, PERMANENT STAIRWAY RAMP WITH FIXED NON-FOLDING GUARD RAILS

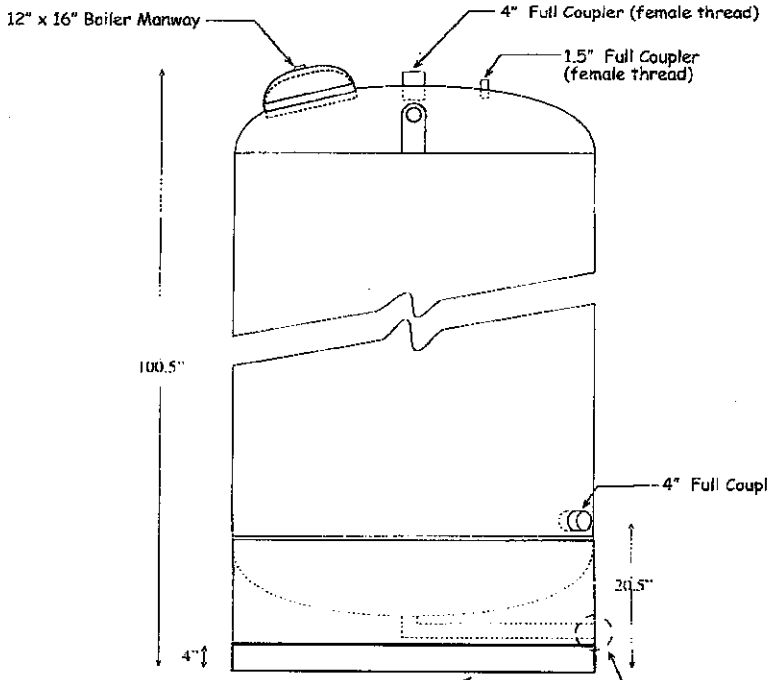
ER Manufacturing Inc.

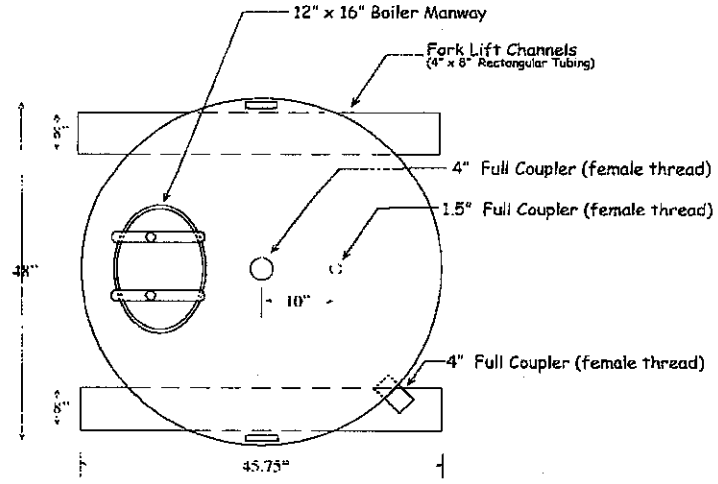
2120 N. Alameda Street Suite # 101
Compton Ca 90222 Mailing: P. O. Box 3062
Phone # (310) 639-1115 Fax # (310) 639-1114
www.ermanufacturing.net
erm@gimcotanks.com
Toll-Free # (888) 80TANKS (U.S.A.)

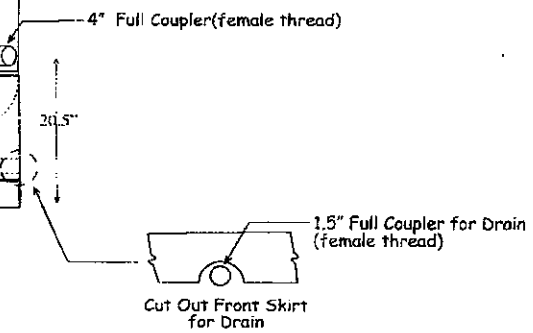


SECTION E-E
SCALE 1 : 25

PRODUCT SPECIFICATIONS	
SHIPPING WT.	1,750 lbs.
CARBON CAPACITY	66.0 CU. FT.
PRESSURE	MAX 50 P.S.I.
TEMPERATURE	MAX 120° F







CONSTRUCTION SPECIFICATIONS
1/4" Side Shell
5/16" Heads
1/4" Thick Rectangular Tube (Forklift Channels)
Welded Seams Inside and Out
Lining (Epoxy coated or equivalent)
Primed and Painted Outside

2000 VESSEL

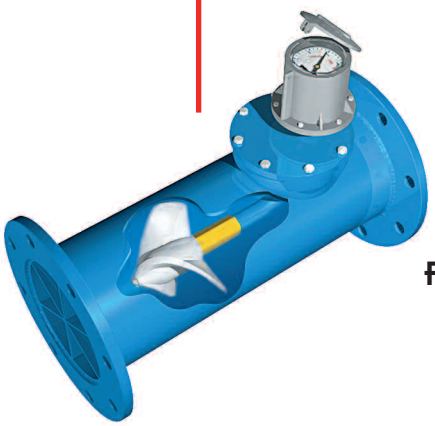
DATE: 3-14-02 SCALE: NTS

Propeller

Flowmeter

Technology

McCROMETER Propeller



For the Real World.

McCROMETER

The Flow Measurement Specialists

Propeller Flowmeters

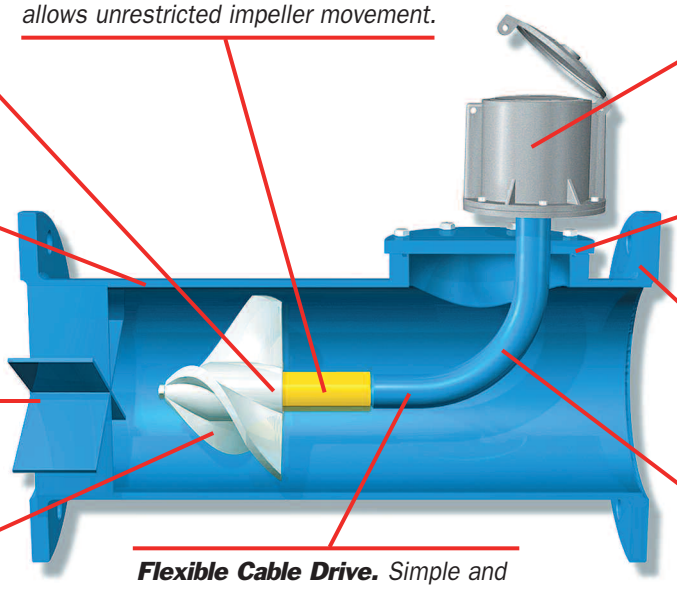
Long-lasting Stainless Steel Ball Bearings. *Factory lubricated and protected from flow stream.*

Epoxy-Coated Carbon Steel Body. *All stainless steel construction available.*

Straightening Vanes. *For optimum flow profiles.*

Corrosion-Resistant Impeller. *Made of durable polymer material, factory calibrated to retain accuracy.*

Magnetic Coupling System. *Isolates register and drive system from flow and allows unrestricted impeller movement.*



Flexible Cable Drive. *Simple and durable, protected by self-lubricating cable guide.*

Instantaneous Flowrate Indicator and Totalizer. *Housed in a Die-Cast Aluminum Register Canopy.*

Removable Top-Plate Assembly. *Available on many models for easy access during field service or replacement.*

Wide Variety of End Fittings. *Including threaded, grooved-end, flanged, and weld-on.*

Heavy Gauge Stainless Steel Support. *Resists corrosion.*

The Most Proven, Dependable Choice

McCrometer offers a complete line of dependable and economical propeller flowmeters for the widest range of applications—from fire hydrant testing to effluent management to farm irrigation. Designed to operate in real-world environments, these flowmeters can measure turbulent flows and fluids containing debris, suspended solids, and other contaminants with an accuracy superior to other technologies.

McCrometer's Mc Propeller flowmeters offer a simple and efficient design. They are easy to install, use, and maintain. After over 50 years of installations, it's no wonder these economical workhorses remain the number one choice for so many water management applications.

Self-Cleaning, Durable Design

Key to the success of McCrometer's Mc Propeller flowmeters is a self-cleaning design that prevents the build-up of solids. A unique, magnetic coupling system keeps the register

FIRE HYDRANT FLOWMETER M1104

- Lightweight, portable design
- Instantaneous readings

BOLT-ON SADDLE FLOWMETER MO300

- 4″ to 16″ line sizes

LARGE-LINE, BOLT-ON SADDLE FLOWMETER M1400

- 18″ to 48″ line sizes

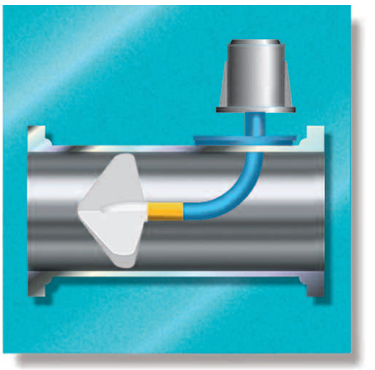
BOLT-ON SADDLE SURFACE WATER FLOWMETER M0300SW

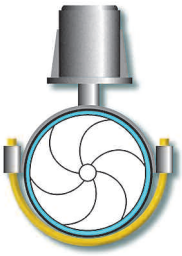
- 4″ to 12″ line sizes

OPEN FLOWMETER M1700

- 10″ to 72″ and larger line sizes

The McCrometer Mc Propeller flowmeter's self-cleaning design uses a flexible drive shaft running within a curved, stainless steel "ell" that makes it easier to shed debris.





The positioning of the impeller directly in the flow stream assures full-flow measurement and greater accuracy.

The McCrometer Propeller flowmeter comes with a standard instantaneous flowrate indicator and straight-reading totalizer. An optional electronic FlowCom register is also available.

six-digit, straight-reading totalizer. They are available in gallons, cubic feet, acre feet, cubic meters and other standard measurements. Both mechanical and electronic registers are available.

Accuracy for Challenging Environments

McCrometer's Mc Propeller flowmeters operate in a wide variety of environments without damage or loss of accuracy. They deliver ±2% of true accuracy and ±.25% repeatability over a flowrange of up to 25 to 1. Whether measuring clean or dirty fluids, McCrometer's Mc Propeller flowmeters excel in measuring turbulent flows, and their built-in versatility makes them ideal for retrofits.

Options to Meet a Wide Range of Needs

McCrometer's Mc Propeller flowmeters come in a variety of standard style configurations—including bolt-on saddle meter, open flow meter, and precision tube—and with a host of options for custom requirements. They offer exceptional sizing flexibility, and can be sized for line diameters of 2″ to 96″ and larger.

MAIN LINE FLOWMETER MW500/MZ500

- 2″ to 24″ or larger line sizes

IRRIGATION-FLANGED FLOWMETER ML100

- 6″ to 12″ line sizes

GROOVED AND SMOOTH-END FLOWMETER MG100/MS100

- 2″ to 24″ line sizes

ALL STAINLESS STEEL MAIN LINE FLOWMETER QW500/QZ500

- 2″ to 24″ line sizes

Proven performance.

and drive isolated from the flow while permitting unrestricted movement of the impeller. Free rotation of the impeller also is assured by factory-lubricated, stainless steel bearings.

The high-impact plastic impeller will not flex or otherwise change in dimension. In fact, it maintains its shape and accuracy over the lifetime of the meter. The impeller also is corrosion and erosion resistant, enabling McCrometer's Mc Propeller flowmeters to operate safely in rugged environments.

Easy to Use and Maintain

McCrometer's Mc Propeller flowmeters install easily and require little maintenance. All their components are easily serviced in the field. The register is driven by a flexible steel cable. The register can also be extended topward for easy reading in confined spaces.

Instantaneous Flow Rate Indicator & Straight-Reading Totalizer: Standard

Registers have an instantaneous rate of flow indicator and

THREADED-END FLOWMETER MT100

- 2″ to 6″ line sizes

WELD-ON SADDLE FLOWMETER MW600

- 4″ to 48″ or larger line sizes

RIGHT ANGLE FLOWMETERS MW800/MM800

- 3″ to 24″ line sizes

MAIN LINE FLOWMETER MW900/MG900/MT900

- 2″ to 24″ or larger line sizes
- Smooth, grooved, or threaded ends

FLANGED-END FLOWMETER MF100

- 2″ to 12″ line sizes

Proven performance.

Engineered for Accuracy, Durability, and Economy for...

Municipal Water/Wastewater

and

Agriculture/Turf Irrigation

- **Potable water**
- **Drip and sprinkler irrigation**
- **Wastewater management**
- **Water well production**
- **Marine system testing**
- **Fire sprinkler testing**
- **Pumping stations**
- **Golf courses and park water management**
- **Truck loading and discharge**
- **Canal laterals**
- **Center pivot systems**

McCrometer's Mc Propeller flowmeters measure both flow rate and volume, using turbine technology and a helical shaped impeller. The flowmeter consists of a rotating device, an impeller, positioned in the flow stream. When fluid passes through the meter, it contacts the impeller, causing it to spin. The impeller's rotational velocity is directly proportional to the velocity of the flow. The rotation is translated through a magnetic coupling and flexible drive system to the register. The register automatically calculates the flow rate by multiplying the flow velocity with the cross-sectional area of the meter tube.

The register incorporates an instantaneous flowrate indicator and straight-reading totalizer. The flowrate and total flow may be indicated in virtually any unit of measurement such as U.S. gallons or liters.

McCrometer

Application

Support

At McCrometer, all we make are flowmeters. We have over 50 years of flow measurement experience in municipal, industrial, and agricultural markets.
Our knowledgeable staff can accurately evaluate your flow applications and specify the best metering technology for your specific flow condition. For a free evaluation of your flow application or to find out about our other flowmeter products, contact your McCrometer representative today, or visit our website at **www.mccrometer.com**

Instrumentation Options For Remote Display & Control

McCrometer's Electronic instrumentation is specifically designed for use on all McCrometer Mc Propeller flowmeters, allowing the flow data generated by the flowmeter to be transmitted and incorporated into flow monitoring and control systems. This instrumentation can be ordered along with the flowmeters or retrofitted to any existing McCrometer Mc Propeller flowmeter.

Transmitters

Transmitters can be easily installed on all new or existing McCrometer Mc Propeller flowmeters to provide a variety of signal outputs to flow computers, irrigation controllers, electronic and electromechanical totalizers, chart recorders, Programmable Logic Controllers (PLCs), and computerized data acquisition systems.

Standard signal outputs available:

- Linear 4-20 mA
- Dual forward and reverse 4-20 mA (separate signal for forward and reverse flows)
- Digital 0-12 volt pulse
- Dry Contact Relay
- Open-Collector

Electronic Registers

These battery-powered FlowCom registers come with LCD Rate of Flow and Total Flow displays. They replace the mechanical register and can be mounted directly on the propeller flowmeter or in a remote enclosure. These registers are field programmable and have optional 4-20 mA and pulse outputs.

Flow Computers

Remote mounted microprocessors display both rate of flow and total flow. These flow computers are easily field programmable and can include control features such as high and low alarm set points, control and alarm outputs, relay outputs, RS-485 serial communications ports and 4-20 mA outputs.

Chart Recorders

McCrometer Chart Recorders are remote, microprocessor-based, circular chart recorders for monitoring and permanent recording of flowrate information. They use a thermal printing stylus to draw charts on blank paper. Chart Recorders are available with both 24-hour and 7-day charts. Recorders are also available with 4-20 mA control outputs.

McCROMETER
The Flow Measurement Specialists

3255 West Stetson Avenue, Hemet, CA 92545 USA
Tel: 951-652-6811 • FAX: 951-652-3078
www.mccrometer.com

Lit #24519-13 Rev 1.6/07-08

A C U

Submersible Pump

Electric Motor Driven

Models S2E1–E3.5 200/3, S2E1 230V 3P, S2E1 460V 3P *and* S2E1 575V 3P

Size 2”

PUMP SPECIFICATIONS

Suction Casing: Gray Iron No. 30; Maximum Operating Pressure 47 psi (324 kPa).*
Impeller: Manganese Bronze Alloy C86500.
Seal Plate: Gray Iron No. 30.
Intermediate: Aluminum Alloy No. 356-T6.
Motor Housing: Aluminum Alloy No. 356-T6.
Rotor Shaft: Stainless Steel Type 17-4 PH.
Bearings: Upper and Lower, Open Single Row Ball.
Discharge Flange: Aluminum Alloy No. 356-T6.
Gaskets: Cork with Nitrile Binder (NC710).
O-Rings: Buna-N.
Wetted Hardware: Standard Plated Steel and Stainless Steel.
Strainer: Stainless Steel Type 316; 47% Open Area, 0.31” (7,9 mm) Diameter Openings.
Hoisting Bail: Urethane Coated Steel.

Standard Equipment

NEMA Type 3R Rainproof Control Box. Provides On-Off, Circuit Breaker and Motor Overload Protection. *(See Section130, Pages 80 and 85.)*

Optional Equipment

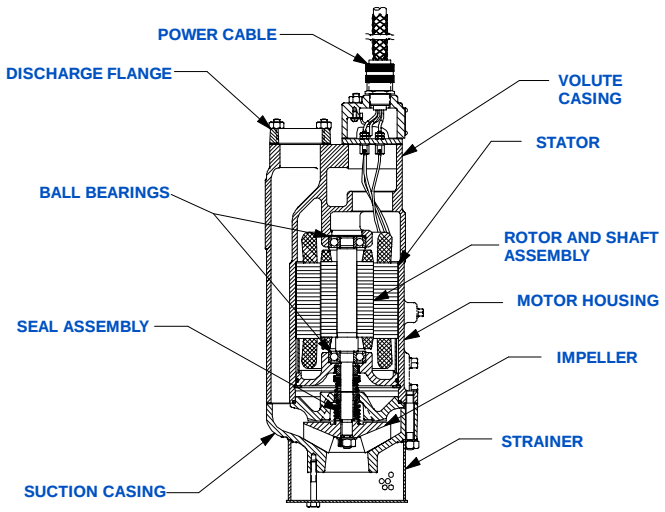
Liquid Level Control:

a. Turtle Type Pressure Activated Level Switch. (*See Sec. 130, Page 150.*)
b. Float Activated Level Switch. (*See Sec.130, Page 150.*)

Staging Adapter Kit: Part No. 48272-002.

MOTOR/CABLE SPECIFICATIONS

Motor: Oil Filled Enclosure. 3.5 H.P.; 3450 R.P.M.; 60 Hz.
Three Phase: 200/230/460/575 Volt, 12.4/10.8/5.4/4.3 Full Load AMPS, 3.7 kW (Max.)
Power Cable: CPE/CSPE Jacket. Type SOW/SOOW; 14 AWG; 3 Conductor, Plus 1 Ground.
Nominal Length 50 Feet (15 m) Standard.
(*Specify Alternate Length at Time of Order.*)
Recommended Generator Size: 6 kW.



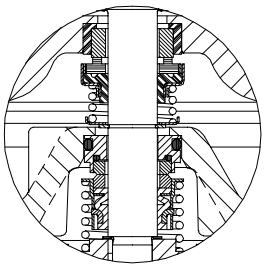
WARNING!
Do not use in explosive atmosphere or for pumping volatile flammable liquids.

SEAL SPECIFICATIONS

Tandem, Oil Lubricated.
Upper: Type 21 Mechanical. Carbon Rotating Face. Ceramic Stationary Face. Buna-N Elastomers. Stainless Steel Type 18-8 Cage and Spring.
Lower: Type 2 Mechanical. Tungsten Carbide Rotating and Stationary Faces. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel Type 316 Cage, Spring and Stationary Seat.

Maximum Temperature of Liquid Pumped 122˚F (50˚C).*

SEAL DETAIL



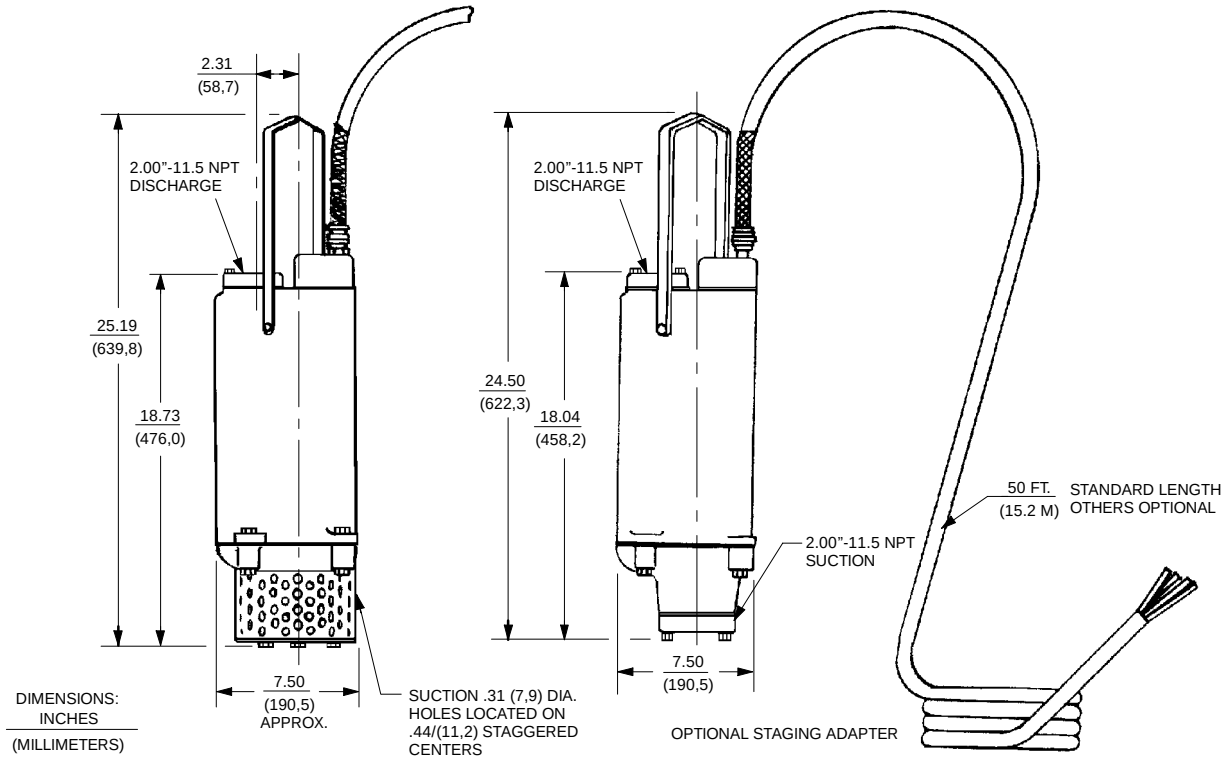
** Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*

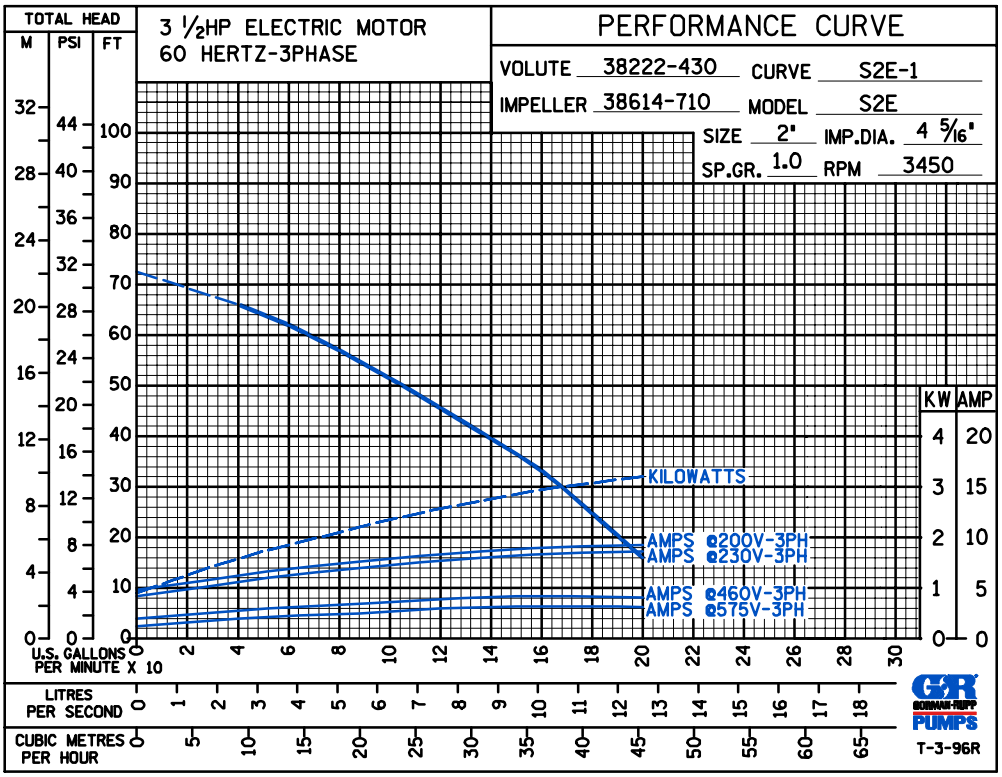
Specification Data

SECTION 130, PAGE 480

APPROXIMATE
DIMENSIONS and WEIGHTS

NET WEIGHT: 80 LBS. (36,3 KG.)
SHIPPING WEIGHT: 100 LBS. (45,8 KG.)
EXPORT CRATE: 5.0 CU. FT. (0,14 CU. M.)





THE GORMAN-RUPP COMPANY ● MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED ● ST. THOMAS, ONTARIO, CANADA

A C U

Submersible Pump

Electric Motor Driven

Models S3C1 230V 1P, S3C1–E6 200/3, S3C1 230V 3P, S3C1 460V 3P *and* S3C1 575V 3P

Size 3”

CERTIFIED PERFORMANCE
CONTRACTORS PUMP BUREAU cpb
The Manufacturer of this pump certifies that it was manufactured in accordance with the standards of the Contractors Pump Bureau.

PUMP SPECIFICATIONS

Suction Head: Aluminum Alloy 356-T6 With Bonded Nitrile Lining; Maximum Operating Pressure 74 psi (5,2 kg/cm^2).*
Impeller: Ductile Iron No. 65-45-12.
Seal Plate: Aluminum Alloy No. 356-T6 With Bonded Nitrile Lining.
Intermediate: Aluminum Alloy No. 356-T6.
Motor Housing: Aluminum Alloy No. 356-T6.
Rotor Shaft: Stainless Steel Type 416.
Bearings: Upper, Open Single Row Ball Bearing.
Lower, Two Shield, Double Row Ball Bearing.
Shaft Sleeve: Stainless Steel Type 304.
Discharge Flange: Aluminum Alloy 356-T6.
Gaskets: Cork with Nitrile Binder (NC710).
O-Rings: Buna-N.
Wetted Hardware: Standard Plated Steel and Stainless Steel.
Strainer: Urethane Coated Steel.40% Open Area, 0.375” (9,5 mm) Diameter Openings.
Hoisting Bail: Urethane Coated Steel**.**

Standard Equipment

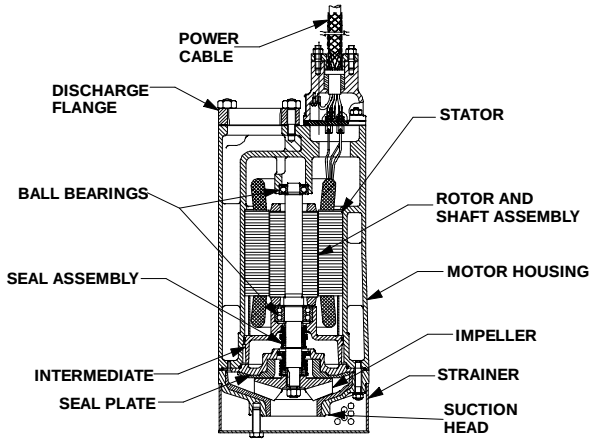
NEMA Type 3R Rainproof Control Box. Provides On-Off, Circuit Breaker and Motor Overload Protection.*(See Section 130, Pages 80 and 85.)*

Optional Equipment

Liquid Level Control
a. Turtle Type Pressure Activated Level Switch. (*See Sec.130, Page 150.*)
b. Float Activated Level Switch. (*See Sec.130, Page 150.*)
Staging Adapter Kit: Part No. 48272-003.

MOTOR/CABLE SPECIFICATIONS

Motor: Oil Filled Enclosure; 6.0 H.P.; 3450 R.P.M.;
Single Phase**:** 230 Volt, 60 Hz, 34 Full Load AMPS, 7.2 kW (Max.)
Three Phase**:** 200/230/460/575 Volt, 60 Hz, 26.5/23/11.5/9.2 Full Load AMPS, 6.8 kW (Max.)
Power Cable: Type SO/SOOW; 10 AWG. 3 Conductor, Plus 1 Ground. Nominal Length 50 Feet (15 m). Standard. (*Specify Alternate Length at Time of Order.*)
Recommended Generator Size: 15 kW.



WARNING!

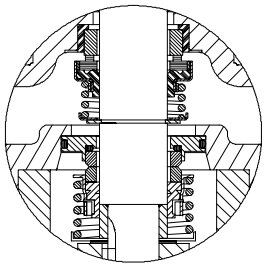
Do not use in explosive atmosphere or for pumping volatile flammable liquids.

SEAL SPECIFICATIONS

Tandem, Oil Lubricated.
Upper Seal: Type 21, Mechanical. Carbon Rotating Face. Ni-Resist Stationary Face. Buna-N Elastomers. Stainless Steel Type 18-8 Cage and Spring.
Lower Seal: Type 2**,** Mechanical. Tungsten Titanium Carbide Rotating and Stationary Faces. Stainless Steel Type 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel Type 304 Cage and Spring.

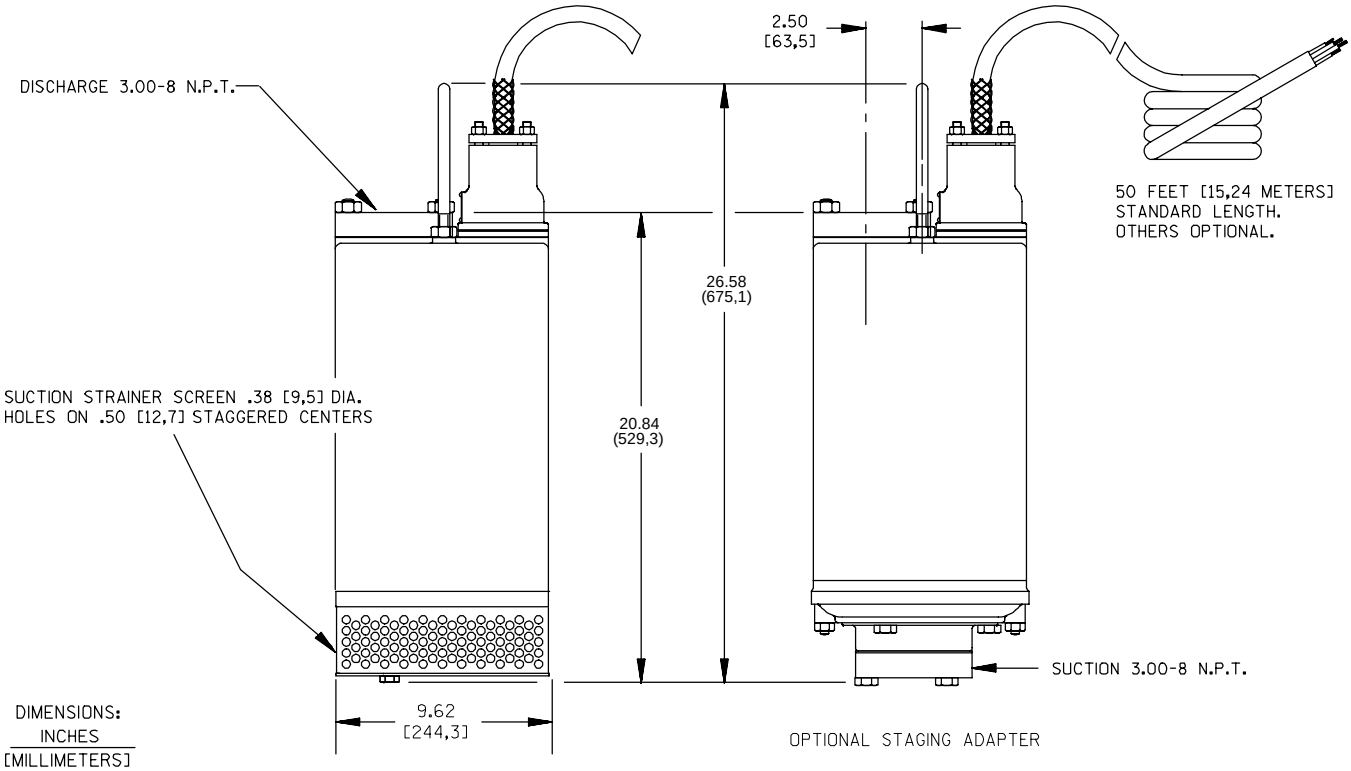
Maximum Temperature of Liquid Pumped, 122°F (50°C).*

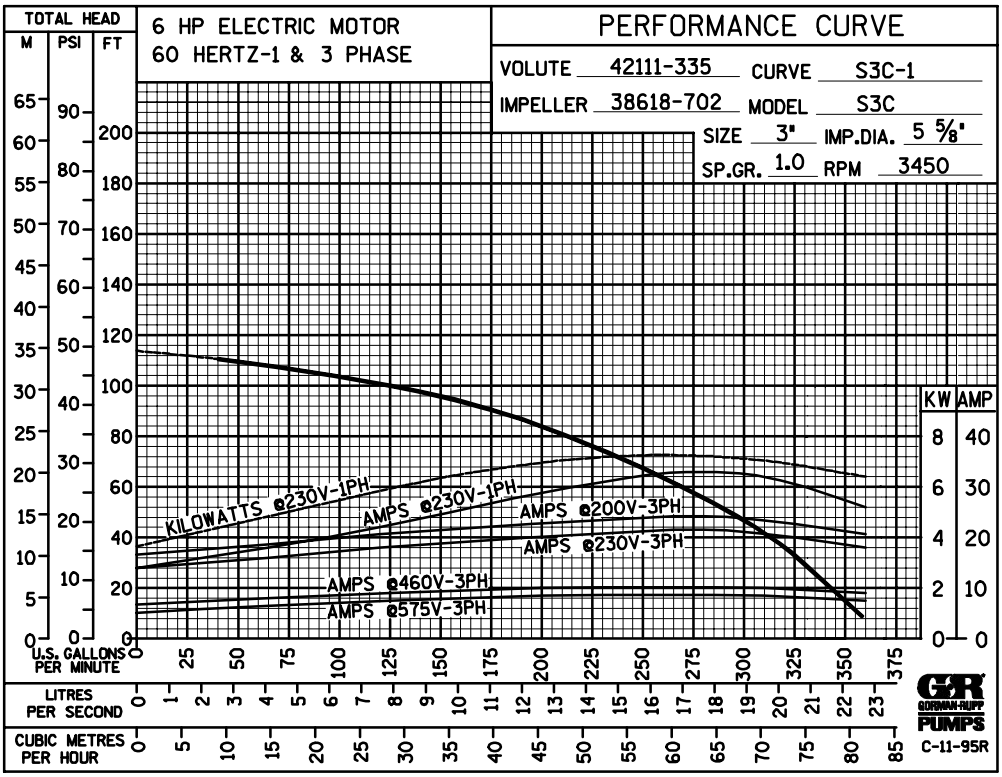
SEAL DETAIL



* *Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*

Specification Data	APPROXIMATE DIMENSIONS and WEIGHTS	NET WEIGHT: 153 LBS. (69,4 KG.) SHIPPING WEIGHT: 168 LBS. (76,2 KG.) EXPORT CRATE SIZE: 7.8 CU. FT. (0,22 CU. M.)
SECTION 130, PAGE 740		





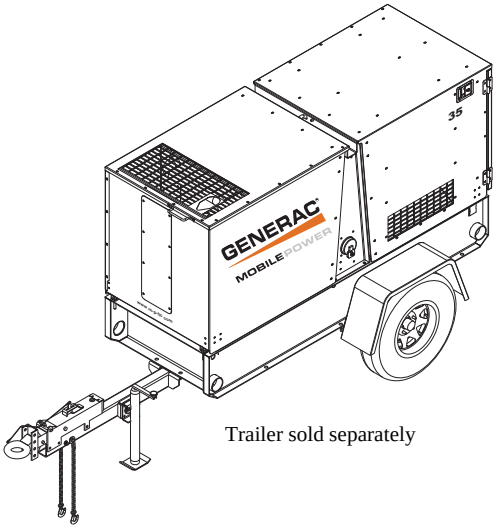
THE GORMAN-RUPP COMPANY ● MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED ● ST. THOMAS, ONTARIO, CANADA

Mobile Generator – MMG35FH Specifications

ENGINE

- John Deere® PE4024TF281 - turbocharged, diesel engine
  - Prime - 43 hp @ 1800 rpm
  - Standby - 48 hp @ 1800 rpm
  - 4 cylinder
  - 2.4 L displacement
  - Tier IV Interim approved
- Steel, single wall fuel tank
  - 106 gal. capacity
  - 95 useable gallons
  - 36.9 hr. run time – full load
  - Fuel tank built into skid of generator set
- Fuel consumption at prime:
  - 100% - 2.6 gph (9.8 Lph)
  - 75% - 2.0 gph (7.6 Lph)
  - 50% - 1.3 gph (4.9 Lph)
- Cooling system capable of operating at 120°F ambient
- Low coolant shutdown
- Radiator and oil drains plumbed to exterior
- Rubber vibration dampers isolate engine/generator from frame
- Disposable air filter - paper element
- Air filter restriction indicator mounted on control panel
- 60 Hz engine/generator
- Electronic isochronous governing



Trailer sold separately

GENERATOR

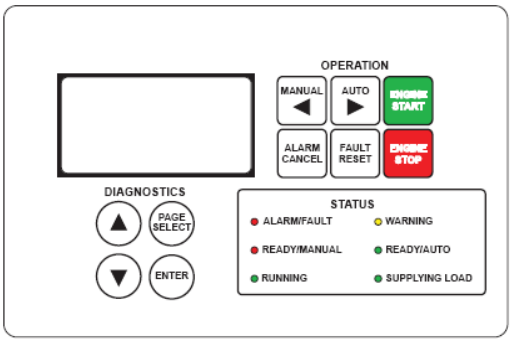
- Marathon Electric®
  - Brushless
  - 4 pole
  - Class H insulation
- Voltage regulation +/- 1% with Marathon SE350 Voltage Regulator

SYSTEM OUTPUT

- 3 position selector switch
  - Single phase – 120 / 240V Zig Zag
  - Three phase – 120 / 208V Low Wye
  - Three phase – 277 / 480V High Wye
- 26 kW / 26 kVA – standby, single phase
- 25 kW / 25 kVA – prime, single phase
- 29 kW / 36 kVA – standby, three phase
- 26 kW / 33 kVA – prime, three phase

SYSTEM CONTROLS

- Microprocessor-based controller
  - Backlit, 128x64 pixel resolution display
  - -40°F to 185°F operating temperature range
  - Thermostatically controlled LCD heater



    - Six LED indicators w/ lamp test
        - Alarm / Fault (Red)
        - Ready / Manual (Red)
        - Running (Green)
        - Warning (Yellow)
        - Ready / Auto (Green)
        - Supplying Load (Green)
- Push buttons for easy operation
    - Manual or Auto Start
    - Engine Start or Stop
    - Alarm Cancel & Fault Reset
    - Scrolling Arrows for Diagnostic Information
        - System kW output display
        - Line output & frequency display
        - Engine diagnostic display
            - Oil pressure
            - Engine temperature
            - Fuel level
            - Battery
        - System hours
            - Running hours
            - kW hours
            - Time to service
    - Alarm list – warnings / shutdowns are date & time stamped
        - Fuel level: warning – 15%; shutdown – 5%
        - Overspeed protection: shutdown – 115%
        - Oil pressure: warning – 25 psi; shutdown – 20 psi
        - Coolant temperature: warning – 220°F; shutdown – 230°F
        - Battery voltage: over – 15VDC; under – 11VDC
        - Generator over voltage: warning – 110%; shutdown – 111%
        - Generator under voltage: warning – 87%; shutdown – 86%
        - Generator over frequency: warning – 105%; shutdown – 110%
        - Generator under frequency: warning – 95%; shutdown – 90%
        - Over current shutdown

ELECTRICAL CONTROLS

- Remote start / stop contacts located next to lug box
- Lockable control box door with diagnostics window
- Lockable lug box with safety switch
    - Trips main breaker when lug door is opened
    - Disables voltage regulator
- Cable entry guides to the lug box
    - Restricts access of foreign objects
- Output ground connection lug inside lug box
- 125A main breaker with shunt trip
- Convenience receptacles with individual breakers (restricted use in high wye mode)
    - (2) 120V 20 Amp GFCI duplex outlets (Nema 5-20R type)
    - (2) 125 / 250V 50 Amp, 3 pole, 4 wire twistlock (Non-Nema 6369)
- Panel mounted rheostat for voltage adjustment - +/- 10%
- 720 CCA wet cell battery

ENCLOSURE

- Generac Mobile Power decals
- "Flip-Hood" Patented design - aluminum, sound attenuated enclosure
  - Easy access for daily maintenance
  - Centralized location for all electrical connections/wiring
  - UV & fade resistant, high temperature cured, white polyester powder paint
  - Insulated and baffled
  - 68 dB(A) at 23 feet – prime power
- Fully lockable enclosure including doors and fuel fill
- Stainless steel hinges on doors
- Emergency stop switch located on outside of enclosure
- Central lifting point
- Multi-lingual operating/safety decals
- Document holder with operating manual including AC/DC wiring diagrams

TRAILER

- "Flip-Tongue" design
- DOT approved tail, side, brake, and directional lights
  - Recessed rear lights
- Transportation tie downs
- Safety chains with spring loaded safety hooks
- 2" ball hitch
- 3500 lb. axle
- 3000 lb. tongue jack with footplate
- P205/75R15 tubeless tires – 6 ply

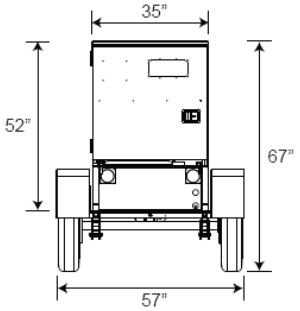
WEIGHTS & DIMENSIONS

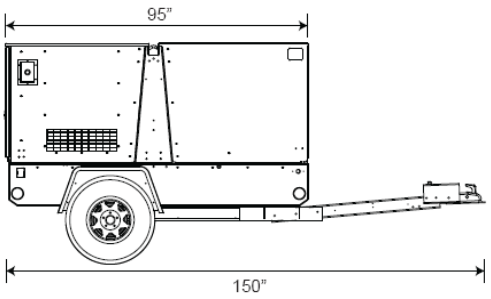
Skid mounted

- Dry weight: 2020 lbs (996 kg)
- Operating weight: 2475 lbs (1206 kg)
- 95 x 35 x 52 in
  (2.41 x 0.89 x 1.32 m)

Trailer mounted

- Dry weight: 2540 lbs
  (1167 kg)
- Operating weight: 2990 lbs
  (1377 kg)
- 150 x 57 x 67 in
  (3.81 x 1.45 x 1.70 m)





WARRANTY

- Engine and generator covered under OEM warranty – consult factory for details.

CERTIFICATIONS

- CSA certified

MMG35FH Options

ENGINE OPTIONS

- In-line engine block heater (Kim Hotstart)
- Fuel transfer pump

ELECTRICAL CONTROLS OPTIONS

- 720 CCA gel cell battery
- Battery disconnect
- Battery charger – 2A trickle

GENERATOR OPTIONS

- PMG Generator - critical grade power quality
- Super Start Generator - motor starting applications

VOLTAGE OUTPUT OPTIONS

- 4 position phase switch
  - Single phase – 120 / 240V Zig Zag
  - Three phase – 120 / 208V Low Wye
  - Three phase – 277 / 480V High Wye
  - Three phase – 120 / 240V Delta
- Dedicated voltage configurations
- Buck Transformer kit – Provides 120V at GFCI outlets when in 277/480V
- Cam locks

SYSTEM CONTROLS OPTIONS

- Analog gauges
- Auxiliary strobe/audible indication for soft & hard alarm conditions

COOLANT OPTIONS

- 60/40 Coolant - cold weather applications

ENCLOSURE OPTIONS

- Fire extinguisher
- Interior cabinet light
- Control panel light

FUEL TANK OPTIONS

- 120% Containment

TRAILER OPTIONS

- Single axle trailer w/ surge brakes
- Single axle trailer w/ electric brakes
- Tandem axle trailer w/ surge brakes
- Tandem axle trailer w/ electric brakes
- 6 pin or 7 spade electrical connectors
- Spare tire/wheel kit

HITCH OPTIONS

- 3” lunette ring
- 2 5/16” ball
- Adjustable height options:
  - 2” ball
  - 2 5/16” ball

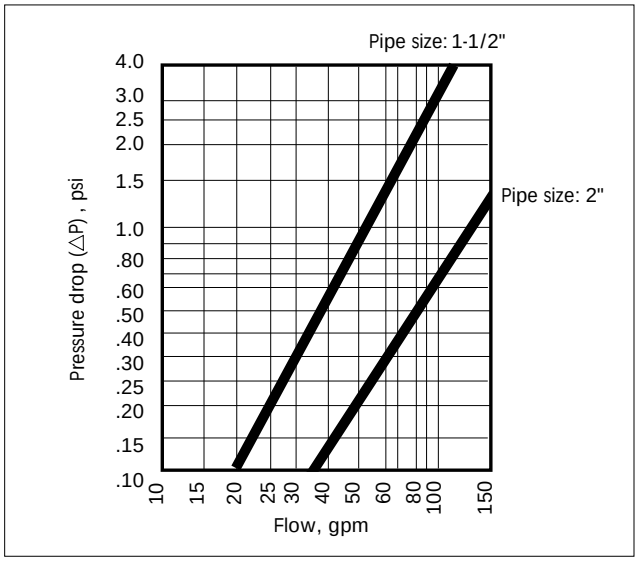
Model LCO Bag Filter Housings

Low cost filter housings for flow rates to 100 gpm*

These high-capacity bag filters are low in cost and offer more dirt holding capacity. These housings are made from carbon steel or stainless steel. They use a clamp cover that is easily removed, reducing time spent on cleaning and bag replacement. Housings also utilize our Unistyle design offering you the option of a side or bottom outlet. There is a 1-1/2-inch or 2-inch inlet and outlet on the side, with a 1-1/2-inch or 2-inch plugged drain at the bottom of the housing. The outlet can easily be changed to the bottom by merely moving the plug from the drain to the side outlet.

Features

- Permanently piped housings are opened without special tools
- Quick opening cover
- Carbon or stainless steel housings
- Large area bag and basket for greater dirt-holding capacity
- O-ring seals: Buna N, EPR and Viton®
- Adjustable-height tripod legs
- 125 psi rated housing
- Basket material is compatible with housing
- Bag surface area is 5.6 square feet (LCO8), and 2.0 square feet (LCO6)
- Uses number 12 size bags (LCO8), and number 8 size bags (LCO6)
- 2-inch NPT ports (LCO8)



*Based on housing only. Fluid viscosity, filter bag used, and expected dirt loading should be considered when sizing a filter.

How To Order

Model LCO

Build an ordering code as shown in the example.

Example : LCO8-30 - 2P - * - 125 - C - B - PB (Housing / Options)

MODEL
LCO6
LCO8

HOUSING SIZE
18-inch (6) =**18**
30-inch (8) =**30**

PIPE SIZE
1-1/2-inch female NPT (6) = **1-1/2P**
2-inch female NPT (8) = **2P**

OUTLET STYLE
Side/Bottom Unistyle = *

PRESSURE RATING
125 psi = **125**

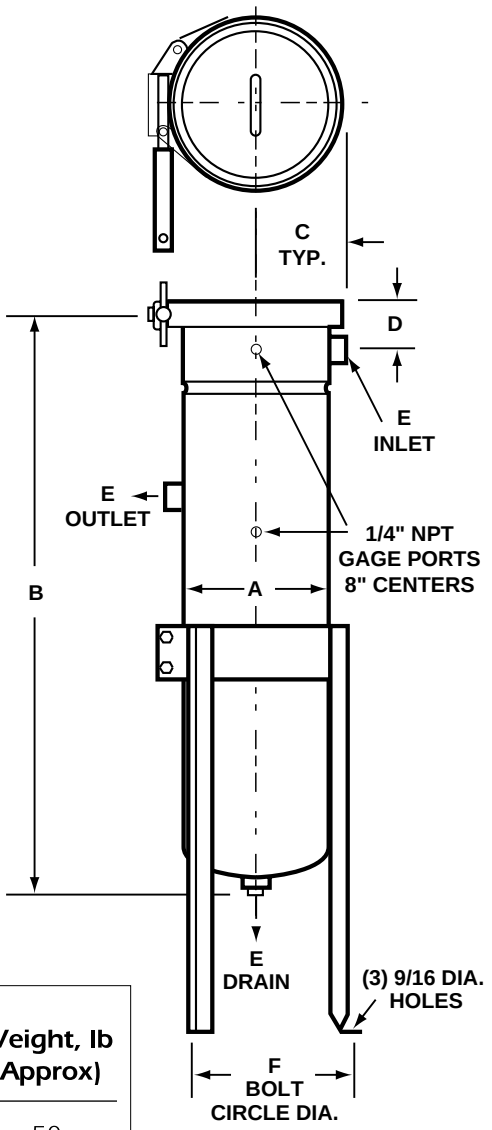
HOUSING MATERIAL
Carbon steel = **C**
304 Stainless steel = **S**

COVER SEAL
Buna N = **B**
Ethylene propylene = **E**
Viton® Fluoroelastomer = **V**

BASKET TYPE
Filter bag basket = **PB**

1. Filter bags are specified separately. See page 134.

Dimensions (IN)



MODEL NUMBER & Dim. A	B	C	D	E	F	PSI	Weight, lb (Approx)
6 (6.0)	28.0	4.3	3.0	1.5	9.5	125	50
8 (8.6)	39.2	6.0	4.2	2.0	12.0	125	70

Dimensions are reference only and should not be used for hard plumbing. Consult factory for certified drawings.

ATTACHMENT 6

Dewatering Treatment System
Operations Check List

Clearcreek CONTRACTORS Environmental/Civil

Daily Dewatering Treatment System Operations Checklist

Inspection Performed By:

Date:

Job Name: JFOS Stage 2 CMP Removal

Project Number: 216083

Item No.	Inspection Item	Description	Criteria	Frequency	Check Box	Remedial Action	If "Yes" Provide Result/Comment
1	Chitosan Sock	Inspect chitosan sock for depletion at dewatering water discharge point in Settling Tanks.	Is chitosan sock depleted?	2 per/shift	❑ Yes ❑ No	Replace chitosan sock if depleted.	
					❑ Yes ❑ No		
2	Tanks						
2a	Flocculation	Inspect tank water for effective flocculation	Does sediment in tank appear to be flocculating?	2 per/shift	❑ Yes ❑ No	Replace chitosan sock if needed. Provide additional residence time within practical limits. Consult NW Water Wizards if chitosan is not effectively flocculating sediment in dewatering water or residence time required is more than 90 minutes.	
					❑ Yes ❑ No		
2b	Sediment	Inspect tank water for accumulated sediment. Note: Jorgensen Forge/Boeing to perform Imhoff test for settleable solids in accordance with KCIW discharge authorization.	Does accumulated sediment exceed 25% of tank's working hydraulic capacity?	1 per/shift	❑ Yes ❑ No	Remove sediment from tank. Transfer to holding container for future disposal with Subtitle C transport.	
2c	Water Level	Observe level of water in tank	Are freeboard in tank and pumping rate acceptable to avoid overflow?	Hourly/ As Needed	❑ Yes ❑ No	Adjust inflow and discharge to prevent tank overfilling as needed. Valves shall be adjusted, or pumps shut off as needed.	
2d	Water Temperature	Check water for temperature in excess of 150°F per KCIW discharge authorization	Is water temperature above 150°F?	1 per/shift	❑ Yes ❑ No	High water temperatures are not expected, but should be confirmed daily per conditions of the permit. Sensory observation or thermometer may be used to confirm.	
3	Pumps						
3a	Fuel	Check fuel level	Is fuel level low?	1 per/shift	❑ Yes ❑ No	Fill fuel tank.	
3b	Oil	Check oil level	Is oil level low?	1 per/shift	❑ Yes ❑ No	Fill oil reservoir if level is low.	
3c	Lube	Lube	Is pump in need of lube per operations manual?	1 per/shift	❑ Yes ❑ No	Lube daily or if pump is not operating correctly.	
3d	Operation	General operations	Is pump malfunctioning?	As needed	❑ Yes ❑ No	Repair or replace pump as needed.	
4	Plumbing	Inspect for leaks	Are pipes, hoses, valves or fittings leaking?	2 per/shift	❑ Yes ❑ No	Repair leaks immediately. Close off system as needed.	
					❑ Yes ❑ No		
5	Totalizing Flow Meter	Check totalizing flow meter for total daily discharge. Record each reading.	Is total daily discharge more than 288,000 gallons?	2 per/shift at beginning and end	❑ Yes ❑ No	Decrease pumping rate and perform flow rate test.	
					❑ Yes ❑ No		
6	Flow Rate	Check discharge flow rate. Record flow at meter over a minimum 10 minute period.	Is discharge rate greater than 200 gpm?	2 per/shift	❑ Yes ❑ No	Decrease pumping rate and retest until criterion is met.	
					❑ Yes ❑ No		
7	Bag Filters	Check pressure indicators on either side of bag filters	Is pressure differential greater than 15 psi?	2 per/shift	❑ Yes ❑ No	Replace bag filters.	
					❑ Yes ❑ No		
8	GAC Units	Check pressure indicators on either side of GAC units	Is pressure differential greater than 15 psi?	2 per/shift	❑ Yes ❑ No	Check for clogging and clean top of GAC unit or replace carbon as needed. Switch lead and lag units as needed. based on self monitoring performed by Jorgensen Forge/Boeing.	
					❑ Yes ❑ No		
9	Self Monitoring	Self-Monitoring to be performed by Jorgensen Forge/Boeing per conditions of KCIW discharge authorization	Does self-monitoring indicate that system modifications are needed?	per KCIW discharge authorization	❑ Yes ❑ No	Stop operation, change out components and/or modify system including GAC, flocculent and residence time based on self monitoring performed by Jorgensen Forge/Boeing.	

Specific Permit Operations Requirements
(See KCIW Discharge Authorization for all requirements)

1		KCIW Preoperative Inspection	KCIW preoperative inspection required and written approval must be received to begin discharge
2		KCIW Discharge Authorization	A copy of the KCIW discharge authorization must be kept on-site at all times during DTS Operations.
3		Discharge Rate	200 gpm maximum discharge flow rate. 288,000 gallons maximum daily discharge.
4		Sampling	Weekly sampling of lead and lag GAC units by Jorgensen Forge/Boeing to check for breakthrough.
5		Self-Monitoring	Self monitoring sampling required by the KCIW discharge authorization is to be provided by Jorgensen Forge/Boeing.
6		PCB Discharge Level	If self-monitoring by Jorgensen Forge/Boeing indicates PCBs above allowable discharge levels, treatment shall cease until GAC unit(s) are changed out.
7		List of Jorgensen Forge and Clearcreek responsible personnel	Provide list of responsible personnel to KCIW no later than August 1, 2016; update as needed.

Comments: